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LAND UTILISATION IN THE SHEWA PROVINCE OF ETHIOPIA

by

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ABSTRACT

The province of Shewa is located in the centre of Ethiopia and the national capital, Addis Abeba, is located at its centre. The Shewan Plateau and the higher parts of the Rift Valley in southern Shewa, comprising more than three fourths of the total area of the province, provide suitable conditions for farming. Nearly 96% of the population of Shewa lives in this part of the province. The remainder is inhabited by the nomadic Adal herdsmen.

The study deals with the utilisation of land by the people in the cropland area of Shewa. The cropland has been divided into four regions based on natural and human factors, and the present state of subsistence farming has been examined in each region. The results of a questionnaire survey of 255 farmers have been included to explain reasons of the existence of subsistence farming in a province which has high agricultural potential, as has been demonstrated by the commercial farms which have been established very recently.

To facilitate comparision with other parts of Ethiopia as well as with studies of other countries the land use classification suggested by the World Land Use Survey of the International Geographical Union has been adopted and modified according to the local needs.

The study has been divided into three parts:- Part One consists of the physical and human background, Part Two discusses the land utilisation in cropland region of Shewa, and Part Three contains conclusions. The tables obtained from the questionnaire survey have been included in Appendices after Part Three.

CONTENTS

LIST OF ILLUSTRATIONS AND APPENDICES

PLATES

PLATES

LIST OF APPENDICES AND TABLES

APPENDIX

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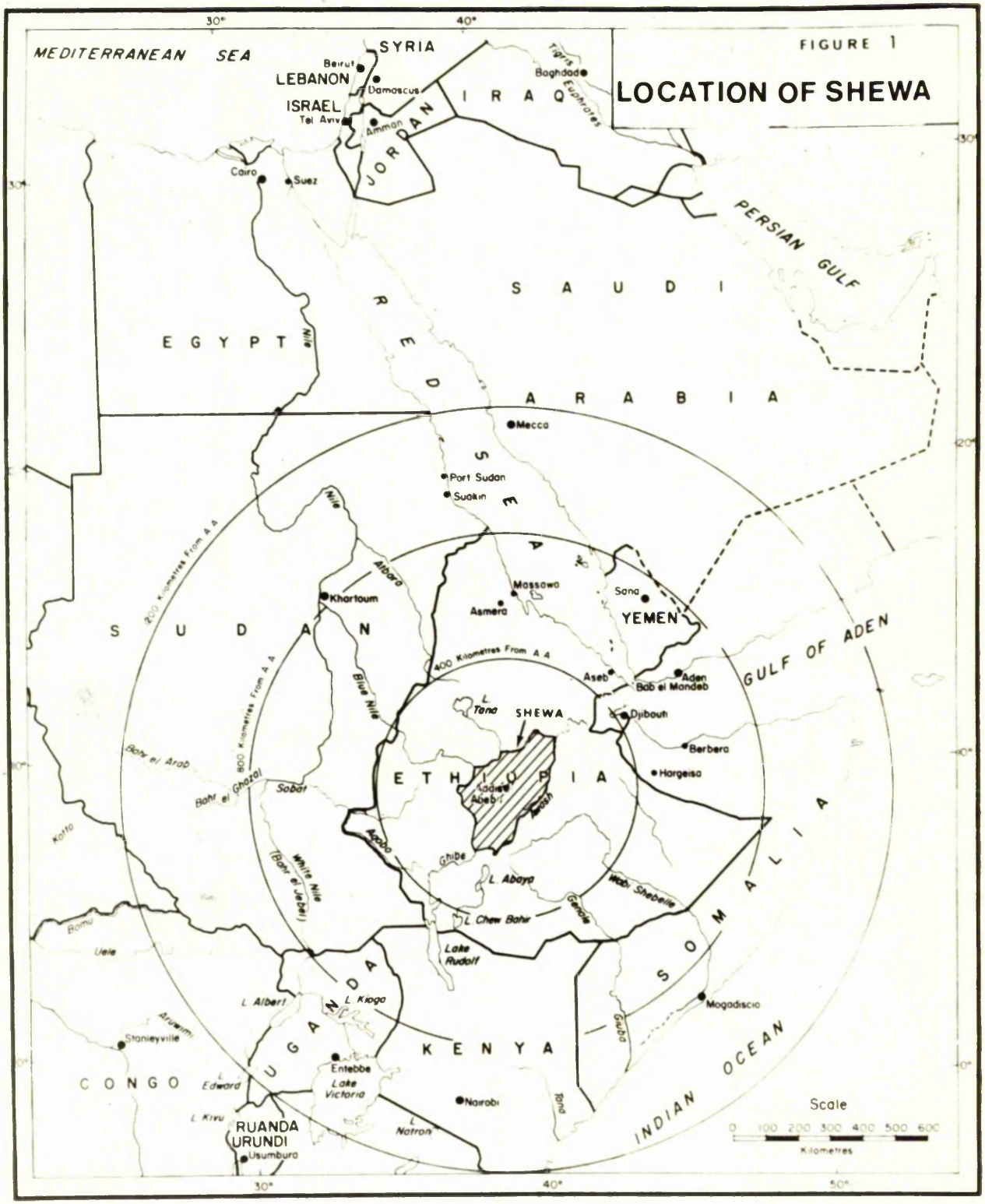
2. INTRODUCTION

Shewa, which was once an outlying province of Ethiopia when the political activity was centred around Axum and Gondar, became the hub of the whole country only in the last century when the capital of the empire was transferred from Ankober to Addis Abeba. Before the founding of this new capital there was no permanent single headquarters of the Ethiopian kings and the whole royal retinue along with the army and the court moved around with the monarch.

After the enlargement and consolidation of a large empire through the absorption of peripheral peoples Emperor Menelik decided in 1887 to maintain his permanent capital near Entoto which was named Addis Abeba (New Flower).[1] With the elevation of Menelik to the imperial throne and his founding the national capital in the heart of the province, Shewa began to be the centre of political, and later, economic activities. Addis Abeba was later connected by a railroad constructed by the French with the port of Jibuti in the previously French Somaliland. This connection with the outside world made Addis Abeba a large, and later the largest, centre of trade and commerce of Ethiopia. With the establishment of the headquarters of the United Nations Economic Commission for Africa and the Organisation of African Unity, Addis Abeba (644,000)[2] has become a famous city at home and abroad attracting people from every part of Ethiopia, and Africa as well as other continents. Since all parts of Shewa lie within a radius of about 300 kilometres from Addis Abeba, the city has a great influence on the countryside. For most of the people its splendour is a great attraction and it



SOURCE: After Mesfin Woldemariam, Atlas Of Ethiopia, 1962

and it is a lifetime desire of everyone in the countryside to see it one day.

Except in the south, and for a very small section in the north, the boundary of Shewa corrosponds with some of the major rivers of Ethiopia such as the Abay in the north-west, Omo in the west and Awash for a large section in the east. These rivers always hindered communication with other parts of Ethiopia. The Abay and Omo separate the Shewan Plateau from the rest of the Ethiopian highlands to the north-west and west by their deep canyons. During the four months of the rainy season from July to October the Shewan Plateau is entirely cut off from Gojam and Kefa, except at the places where the bridges on both these rivers make them passable. The Awash river, however, was easier to cross. But as the Awash Valley was inhabited by the hostile and ferrocious Danakils or Adals the highlanders were cut off from the eastern part of Ethiopia for a long period.

Lying between 6°N and 11°N latitudes and 37°E and 41°E longitudes Shewa covers an area of 85,200 square kilometres in the centre of the central highlands of Ethiopia. More than three fourths of Shewa is relatively high (more than one thousand metres above sea level). These highlands are referred to as the Shewan Plateau in the text, and the rest of the province as the lowlands of the Rift Valley. Of the total population of Shewa of 4,321,000 only about 8,000 live a nomadic life, and they inhabit the northern section of the Rift Valley, which has been referred to as the Awash Valley in the text to distinguish it from the southern section of the Rift Valley where people follow a sedentary life of farming and pastoralism. Except in the Awash Valley, the whole of the population

of Shewa lives on the higher altitude of the Shewan Plateau and the southern section of the Rift.

The Shewan Plateau and the southern section of the Rift provide temperate and semi-tropical temperatures, good amounts of rainfall and fertile volcanic soils for farming. There were several wars between the various ethnic groups, wars in which the possession of this undulating plateau was contested. The Amharas from the north, Gallas from the south and south-east, and the Sidamas again from the south, have all tried to dislodge each other from this area until Emperor Menelik, the Amhara ruler, subdued them in the last century. Today the Amharas live predominantly in the north, in Menz, Merhabete and Tegulet, while in central Shewa they live mixed with the Gallas, who outnumber them here. But both of these groups have become deeply assimilated in this part of Shewa through inter-marriages and there is little to distinguish them. By mixing with the Gallas to this extent the Amharas have been able to control the other ethnic groups, as well as other religious groups, not only in Shewa but in Ethiopia as a whole. In the south-western part of Shewa the ensete-eating Gurage, Hadya and Kembata people live on about one fourth the area of the province.(See Figure 6 on page 78). These people are of Sidama stock and their food from the banana-like plant, ensete, which is abhored by the Amharas and Gallas to the north, has given them distinctiveness in land utilisation. The grain-eating Amharas and Gallas depend on the plough for farming, while the Gurage and Kembata rely mainly on the hoe for digging in the ensete plantations.

This study deals with the conditions of farming in different parts of the Shewan Plateau and the southern section

of the Rift Valley. The temperate climate and volcanic soils provide favourable conditions for farming and yet the farmers grow nothing more than for mere subsistence. This study further looks into the reasons which are responsible for this situation. For this purpose the whole farming area has been divided into four regions. Each region has its own individuality and its local environment, physical as well as human, which are responsible for the particular pattern of land utilisation.

A questionnaire survey of 255 farmers was conducted in the countryside along the all-weather roads. It would have been ideal if the land use samples had been taken also in the more remote parts of Shewa. But this was not possible because of the inaccessibility of these areas. It is not claimed, therefore, that a complete record of land use in Shewa is being presented but it is felt that the land use samples represent the position in a greater part of the province. It is also not suggested that the field-work undertaken could form a basis on which to construct a programme of rural development. Such a programme, to be soundly conceived, would require field-work on a scale beyond the capabilities and resources of a single worker. It would require a basis of reliable topographic maps made from the air photographs already available in Ethiopia, and then much field-work in the interior of Shewa. However, it is maintained that the field-work done by the author presents a strong case for the use of the analysis of land utilisation in Shewa by the official departments. It could also for a step in the direction of systematic assessment of resources in Ethiopia.

The thesis is presented in three parts. Part One deals with the physical and human background. Part Two analyses the

present state of land utilisation in the cropland region of Shewa. The classification of land use is that suggested by the World Land Use Survey of the International Geographical Union, since this was found to be a satisfactory set of definitions with some modifications. Conclusions are set out in Part Three.

References are listed on a chapter basis after Part Three of the thesis. These are followed by appendices containing data obtained from the government departments and the questionnaire survey conducted by the author. There are also other data which have been computed by the author. The sources of all the figures have been mentioned in each appendix and table.

Wherever possible, the spellings of place names used by the Ethiopian Mapping and Geography Institute have been used. However, some of the place names could not be verified from the transliteration system of the Ethiopian Mapping and Geography Institute during the course of writing in London. In those cases the most widely used spellings in the books and maps available have been used. It should be noted that the spellings of Nazret is different on the maps than the text. The maps were drawn long before the spelling used by the Ethiopian Mapping and Geography Institute was found, but then it was not possible to change it on all the maps.

The Ethiopian unit of land measurement, 'gasha', has been used in the text. But such figures are always followed by their equivalent in hectares in paranthesis. There are also some other Amharic words which have been frequently used such as 'tukul', 'teff', 'ensete' etc. They have been used because in most cases they have no equivalent in English language. They have been listed in glossary with their nearest equivalent in English, or if it was not possible their Latin names have been given.

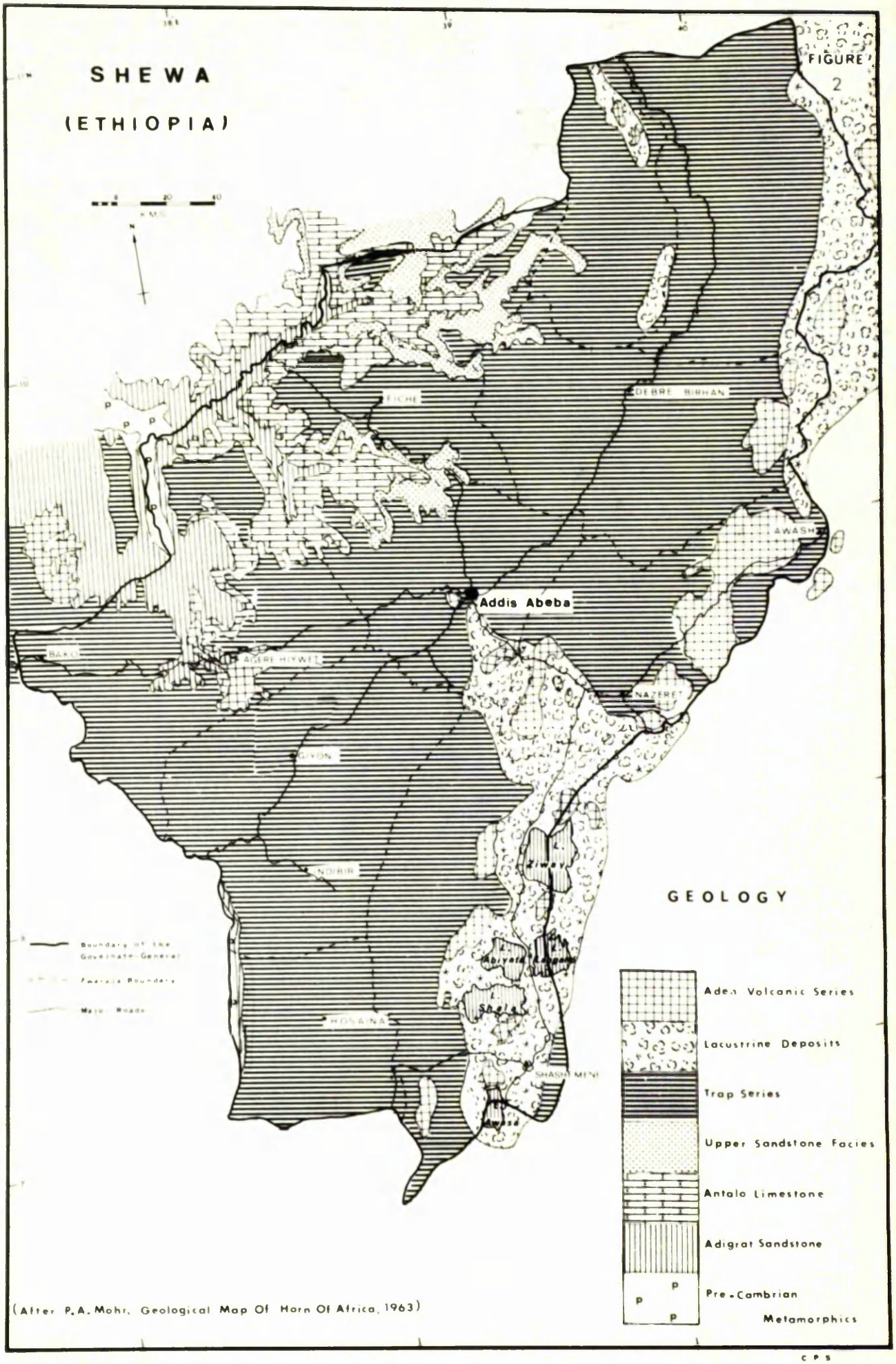
PART ONE: PHYSICAL AND HUMAN BACKGROUND

3. GEOLOGY
4. PHYSICAL FEATURES AND DRAINAGE
5. CLIMATE
6. SOILS
7. VEGETATION
8. POPULATION

3. GEOLOGY

The area within the political boundaries of Shewa Province lay in the middle of all geological activities which took place in the region known as the Horn of Africa. The transgression and subsequent regression of sea over the Basement Complex of Pre-Cambriam age, followed by the Arabo-Ethiopian swell, extrusion of flood lavas in the Tertiary, and the formation of the Great Rift System have all determined the physiography of this region.

The Basement Complex of Africa is represented in Ethiopia by metamorphosed sedimentary and intrusive rocks composed of granite gneisses and schists, the former generally overlain by the latter. These rocks are exposed in the peripheral regions of Ethiopia, such as, in Eritrea and northern Tigre where most of the surface is formed by crystalline basement, in Harer, in the far south in large parts of Sidamo and Gemu-Gofa, in western lowlands of Welega and Gojam which further extends into the Sudan. The Basement Complex is also exposed in the gorges of several rivers including those of the Abay and the Omo which make the north-western and western boundaries of Shewa. This basement of Pre-Cambrian age lies buried under all the more recent rocks in Shewa and cannot be seen except in small sections of the gorges of these two rivers (Figure 2). For the composition of the Basement Complex one could do no better than quote Mohr, "It consists of a complex of metamorphic rocks of many different grades and types in some of which the original character is still discernable. Almost unaltered sedimentary rocks and igneous intrusions also occur, together with mineralised hydrothermal veins which formed the last igneous manifestations of the Pre-Cambrian."[1] The metamorphosed sedimentary rocks are commonly in the form of paraschists, while severe metamorphism of igneous rocks yielding


SHEWA
(ETHIOPIA)
FIGURE 2
Addis Abeba
AWASH
NAZERET
ZIWAY
SHASHEMENE
GEOLOGY
Aden Volcanic Series
Lacustrine Deposits
Trap Series
Upper Sandstone Facies
Antalo Limestone
Adigrat Sandstone
Pre-Cambrian Metamorphics
(After P.A. Mohr, Geological Map Of Horn Of Africa, 1963)

mica schists, amphibole schist and gneiss is frequently observed in the Complex. Granite, however, is far the commonest of the fresh intrusive rocks.

The Basement Complex was heavily denuded for nearly 500 million years in the Palaeozic when old orogenic mountain ranges were worn down into near peneplains. Where the Pre-Cambrian rocks have not been denuded by the later rocks of Mesozoic and Tertiary the former have denuded right up to the present day. But at several places the Pre-Mesozoic surface of the Basement Complex has been protected and preserved beneath the later rocks and it can still be seen along the present day gorges of the rivers. Jepson (1960) has found evidence to this in the bottom of the Abay gorge.[2]

After this prolonged erosion, the Horn of Africa was invaded by a sea advancing from south-east to north-west. This transgression resulted from a big advance of the south-easterly arm of the Tethys which spread over the Arabo-Ethiopian shield, through present day East Africa as far south as Madagascar. This resulted in the deposition of great thicknesses of sedimentary rocks, mainly sandstones and limestones, termed as the Adigrat Sandstone and the Antalo Limestone. By the end of the Mesozoic the entire Horn of Africa was again raised causing a regression of sea from north-west to south-east. Though the thickness of the sedimentary formations remains fairly constant, it is greater to the south-east which was submerged for a longer period.

The Adigrat Sandstone, the lowest element in the geological sequence, was first so termed by Blandford because of its extension around the town of Adigrat in Tigre. It varies slightly in thickness on account of the relief of the Basement Complex over which it lies. It generally consists of a white, quartzose sand-stone containing grains of mica, feldspar, etc. The sandstone

generally has several layers. Occasionally, a conglomerate rich in iron-oxide containing boulders and pebbles occurs at the base. Interbedded in the Adigrat Sandstone formation are variable layers of coloured shales, haematite and limonite-rich bands, bands of coarse grits and angular conglomerates, and layers of sand containing fossil-wood. In Shewa the Mesozoic strata are exposed in the Abay gorge between the confluence of the Jema and Guder with Abay. The actual age of the Adigrat Sandstone in Shewa is determined as Liassic and it attains here a thickness of about 500 metres. At the Abay-Guder confluence the red and ligh-gray sandstones of the Adigrat Sandstone are capped with eroded remnants of recent basalts.

The Jurassic produced the Antalo Limestone as the first fossiliferous formation in the geological succession. It is always underlain by the Adigrat Sandstone and has never been found lying immediately over the Basement Complex. It comprises many lithological types of limestone and includes layers of marl and silt and occasionally arenaceous bands, especially near the top. The richness of marine fossils indicate a shallow sea in which the Antalo Limestone was formed. It varies in thickness from almost zero to 800 metres in some places. The gorges of Abay, Jema, Muger and Guder have revealed magnificient sections of the Antalo Limestone. The rocks in these gorges are more diversified and more fossiliferous than in the northern parts of Ethiopia. The Mesozoic strata of the Abay basin show a completely developed formation from early Jurassic. Their succession and formation can be clear from the

divisions of the strata made by Mohr -

6 Tertiary basalts less than 500m

5 Tithonian Lower Cretaceous (?) 200m

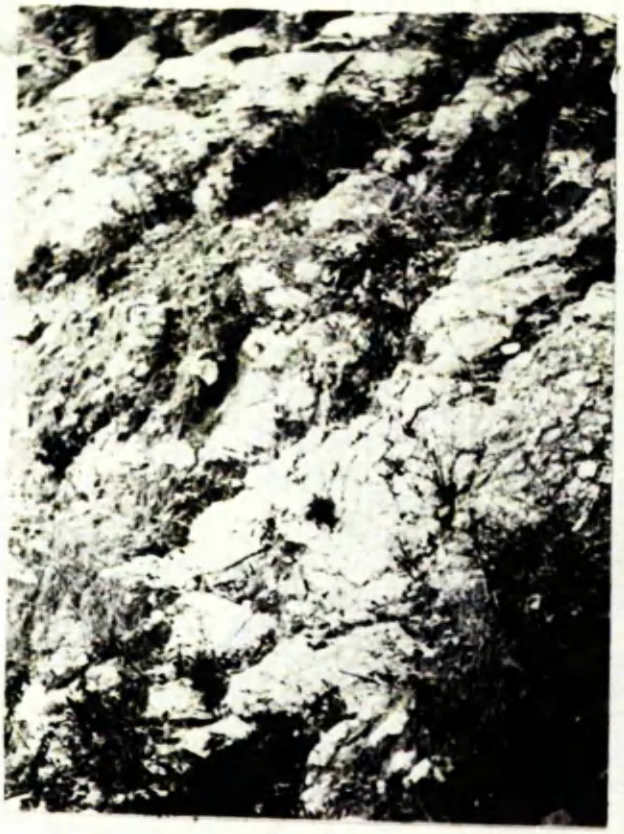
Upper Sandstone - with underlying marls, gypsum

Plate 1.1 Antalo Limestone exposure in the Abay gorge a little above the bridge.

1.2 Granular basalt of Trappean Series cut for road construction near Goha Tsion.

1.3 One of the numerous volcanic cones in the Rift Valley rising above the surface.

1.4 A wall of natural gravel along the road in Abay gorge.



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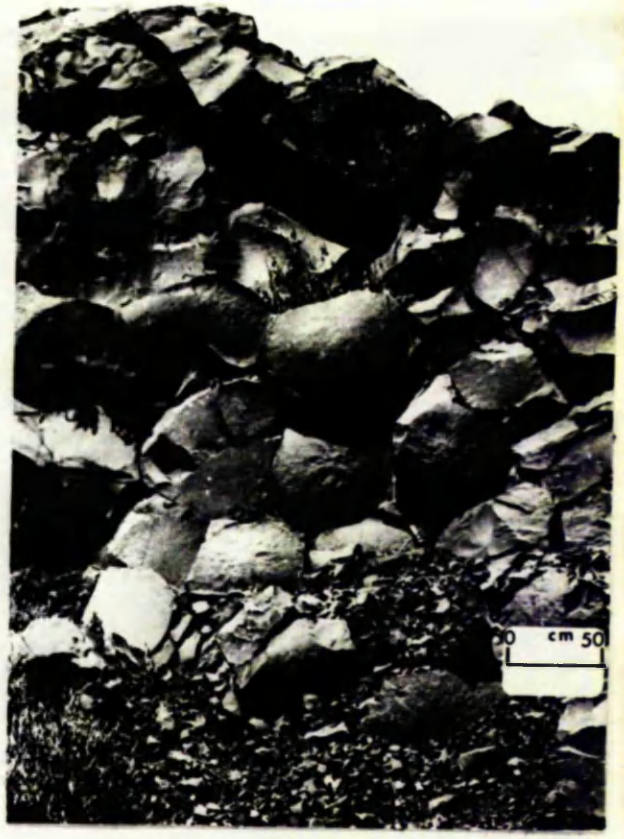


1 - 2

1 - 3

1 - 4

and dolomitic limestone containing small gastropods.

4 Lower Kimmeridgian 100-170m

Upper Antalo or Lagagima Limestone - Yellow crystalline limestone with some marls. A Jura-type molluscan fauna includes Terbratula subsella and Acrocidaris nobilis.

3 Bathonian-Callovian 400m

Lower Antalo Limestone - Marly, hard, compact grey limestone with Trigonia pullus, Modiola imbricatus, Eopecten Aubryi, Rhychonella morieri, R. lotheringica, R. edwardsi, etc.

2 Bajocian (?) 200m

Adigrat Sandstone - White, red, and occasionally blue-black sandstone, frequently micaceous, with layers of green and other coloured shales. No fossils.

In the Guder valley, however, the Upper Sandstone and Antalo Limestone are missing from the succession in some places. This is indicative of the erosion before the Trappean lava extrusions. To the east and south of the confluence of Guder with Abay the limestone and sandstone again appear. South of the Abay basin the Antalo Limestone is not known on the Central Plateau. The exposures of the Mesozoic strata in the Guder gorge are the southern most in Ethiopia.

The uplift of the Horn of Africa and Arabia, and the regression of sea produced the Upper Sandstone facies which are of later date to the south-east, the direction of retreat. This marked the termination of Mesozoic sedimentation everywhere in Ethiopia. The Upper Sandstone is lithologically so similar to the Adigrat Sandstone that it remained a matter of great confusion

Plate 2.1 Sandstone in the Abay gorge

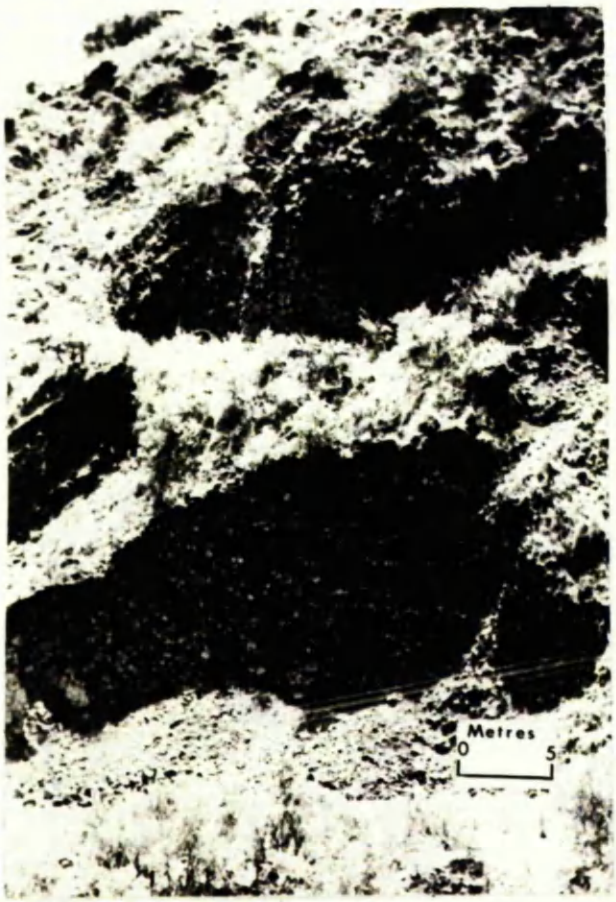
2.2 Stalagtite formation in the Abay gorge

2.3 Conglomerates in the Awash Valley along Nazret-Awash town road

2.4 A recent volcanic cone in the Rift Valley scarcely colonised by vegetation

2.1

2.2



2-3

2.4

in the past. For instance, the Upper Omo (Gibe) sandstone have been ascribed by some authors to Adigrat Sandstone and by others to the Upper Sandstone. In Shewa the Upper Sandstone is well exposed in the Muger and Zega Wodem gorges. But along the Addis Abeba-Debre Markos road it is missing owing to the pre-Trappean denudation. The Upper Sandstone is predominantly white, but occasionally red, with a peculiar undetermined greasy feel to their matrix. The sandstones are frequently cross-bedded but are more generally massive. These are soft and easily eroded. In the Zega Wodem gorge the Upper Sandstone forms 200 metres of unfossiliferous sandstone with marl, clay and gypsum bands near the base.

The late Mesozoic-early Tertiary regression of sea was followed by the uplift of the Arabo-Ethiopian swell in which even the Basement Complex rocks were uplifted to as high as 2,800 metres in some places. Along with and immediately after the uplift of the Arabo-Ethiopian swell there occured extrusion of flood lavas in the Tertiary. It covered great part of the previous rocks of Ethiopia providing them a protective covering which has preserved evidence of their earlier laterization and denudation. The Trap series, or Plateau Basalts, are of a very thick series of lava flows. Their thickness reaches to thousands of metres and show extraordinary thickness over the whole of the plateaus including the Shewan Plateau. The thickness varies from place to place, such as, it is 1,200 metres at Fiche, but only 200 metres in the Abay gorge.

Petrographically the flood basalts are "generally poor or deficient in olivine; the groundmass plagioclase is most commonly labradorite but the phenocrysts, frequently zoned, are usually more calcic; and the pyroxene is magnesium rich, clinoenstatite

or pigionite, with an ophitic texture common; magnetite is a common and sometimes very abundant accessory, whilst brown hornblende and magnesium-rich biotite are much more rare..... Magmas supplying the lavas of Trap Series were generally sodic, calc-alkaline representatives being less common[4]. Between Addis Abeba and Dese both basalts and more silicic lavas are exposed with the former predominating. Interbedded tuffs are common. Higher hills of the plateau north of Addis Abeba are formed of coarsely porphyritic and amygdaloidal basalts such as, Mts. Meghezez, Woti and Abuye Meda. Westwards from Addis Abeba up to the Guder valley basalts predominate. Towards the Rift Valley from Addis Abeba x trachyte and trachytic tuff with some rather recent superimposed basalt cones extend as far as the Dukam river. The Trap Series lavas extend through southern Shewa and Gemu-Gofa up to Lake Rudolf. The Trap Series lavas generally form the Rift floor and its northerly tilt here determines the course of the Awash river. Here, however, the Trappean lavas have now been buried under either the lavas of more recent Aden Colcanic Series or beneath sediments in the middle and lower Awash valley. But where exposed they form extensive and monotonously flat plains.

Like the Trappean Series which form the largest part of the topography of Shewa, and Ethiopia as a whole, the Tertiary times contributed another major feature of the present physiography, the Rift Valley. The Rift Valley in Shewa is merely a small part of the Great Rift System which extends from Syria to as far south as Mozambique embracing a distance of 6,000 kms., equivalent to one sixth of the earth's circumference.

For the origin of the Rift there has been an academic conflict between the tensionists and the compressionists. But in

the light of the geophysical data collected recently Heisknen and Vening Meinesz (1958) have produced the most satisfactory theory of rift formation to date. Summarising this theory Mohr writes, "The Rift System seems to be the result of fracturing of lithosphere under tension, the fractured blocks being free to move under isostatic readjustment forces. The cause of tension in the case of the African Rift System was undoubtedly related to the uplift of the swells, large swell being associated with well-formed rifts and the vice-versa."[5]

In the Ethiopian section of the Great Rift it is interesting to note that the three major rifts to the north of Kenya, i.e., the Red Sea Rift, the Gulf of Aden Rift, and the Main Ethiopian Rift, "unite, converge and meet" in northern Ethiopia where they have produced a very low lying triangular region called as the Afar Depression or Danakil Depression which lies below sea level. The convergence of the above three rifts in Ethiopia has given rise to the complex Ethiopian Rift System. In the north the Red Sea fault forms the Danakil Alps horst along the Eritrean coast. It serves as the block which prevents the water of Red Sea from entering into the below sea level area of the Afar Depression. The Gulf of Aden Rift extends from Somalia into Ethiopia. Its importance in Ethiopia is that it forms the southern boundary of the Afar Depression which is bounded on the west by the great scarp of the Central Plateau of Ethiopia. To the south of this roughly 800 km-sided triangular Depression the Great Rift System continues in the form of the funnel-shaped Main Ethiopian Rift. It is this Rift which forms part of the present topography of eastern and south-eastern Shewa. It narrows down towards the south and passes through no

southern Ethiopia in the form of a neck to join the 'Rifts' in East Africa. Several lakes have been formed on the Rift Valley floor, such as, the Galla Lakes, Lake Awasa, Lakes Abaya and Shamo, Lake Chew Bahir (Lake Stefannie), and Lake Rudolf in the southern section and other numerous lakes in the northern section. A continuation of the Lake Rudolf Rift northwards determines the course of the Omo river, which forms the south-western boundary of Shewa. Related to the formation of the Rift System are the faults in Ethiopia which run close to the present Ethiopia-Sudan border.

The Rift Valley floor is marked by the remains of dried-up basins which are covered with lacustrine deposits indicating the existence of large lakes of which few remained today while others dried up. The group of Galla Lakes in the southern section of the Rift once united together which is evidently clear from the existence of lacustrine sediments in this region. In the northern section of the Rift the string of lakes through which passes the Awash river eventually to fall into Lake Abe was also connected by one sheet of water during the pluvials. In the central Awash valley Lakes Cadabosa, Hertale and the swamp west of Azelu (Ayelu) volcano were also in the form of one lake. All along the Awash valley there is a belt of fossiliferous sediments about 5 km wide. Lake Metahara once extended for a long distance to the north-east. Diatomite sediments have been found in the borings for the Koka dam is also situated on old lacustrine sediments.

The latest major phase in the geological history of Ethiopia was the eruption of numerous volcanoes mainly in the Rift Valley. The volcanic rocks of the Rift floor are termed the Aden Volcanic Series to distinguish them from the earlier Trap Series. They are ascribed to later Pliocene. Indeed, where the Aden Volcanic

Series are found immediately over the Trap Series they can hardly be distinguished from each other. The Aden Volcanic Series include a great variety of lava types, together with many kinds of scoria and tuff. There are numerous volcanic cones in the Rift Valley belonging to this Series. Apart from the innumerable smaller cones, volcanoes such as Azelu, Fantale, Zuquala and Chubi are the most conspicuous of this Series. The denuded volcanoes Yerer, Wachacha and Furi are considered to have been formed at the end of Trap Series.

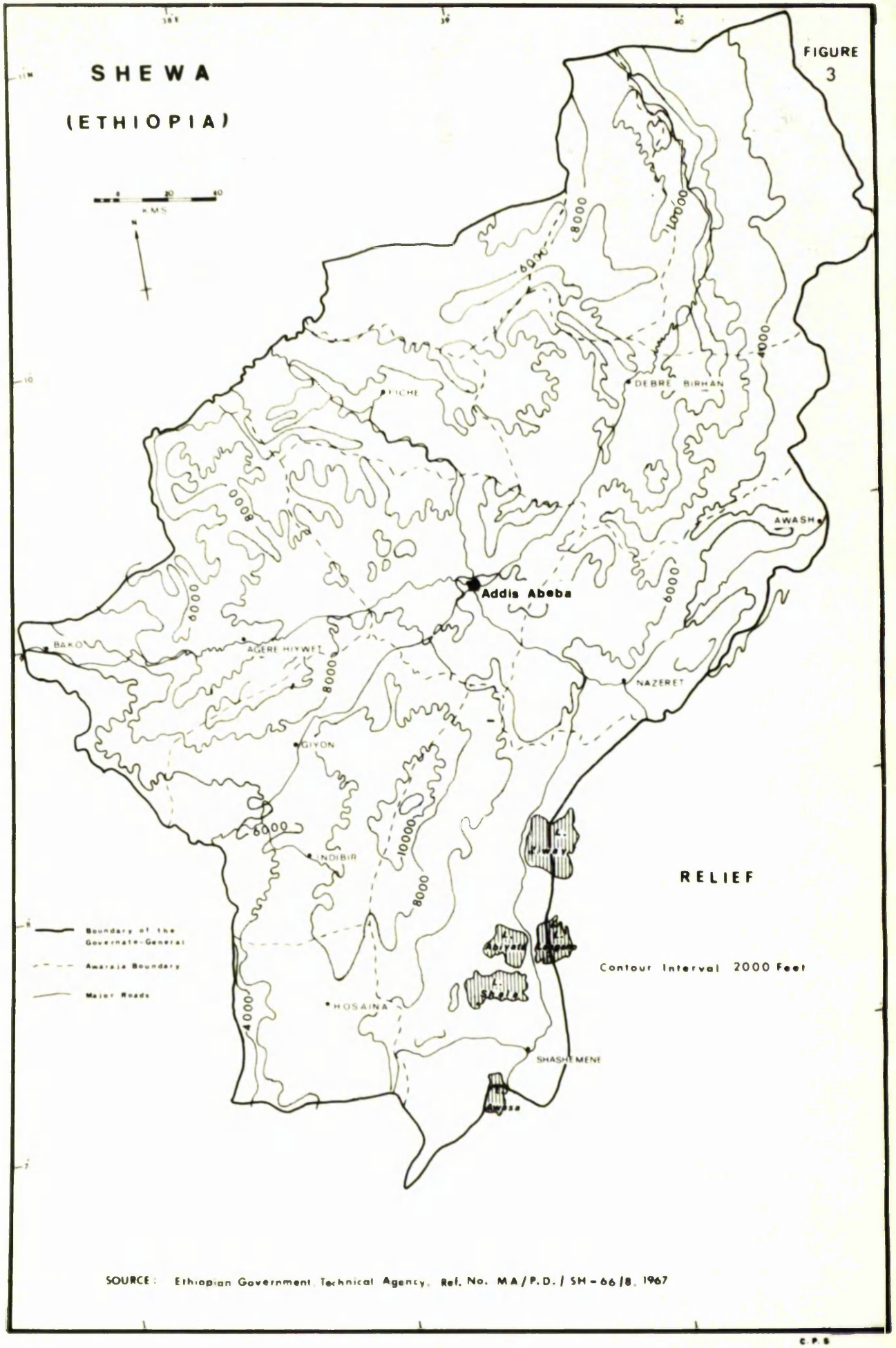
PHYSICAL FEATURES AND DRAINAGE

4. PHYSICAL FEATURES AND DRAINAGE

1. Introduction

There are two chief physical features in Shewa: the Shewan Plateau and, the Rift Valley. Both of these are not separate entities, but they form part of the two largest features of Ethiopia - the Central Highlands and the Main Ethiopian Rift Valley.+ The Shewan Plateau occupies a central position in the Central Highlands for it includes a large part of Shewa from the Abay gorge to the plateau of Kambata. The Rift Valley in Shewa also is the central part of the Main Ethiopian Rift for it consists of the major portion of the western part of the 'funnel'. These two features in some parts of Shewa merge in such a way that it is difficult to demarcate their boundaries. Especially to the south of Addis Abeba the western scarp of the Rift is not very much developed because some of the faults are overlain by rather recent lavas and so the boundary of the Rift is quite obscure. But northern Shewa is devoid of such confusion where the eastern escarpment of the Shewan Plateau marks clearly the boundary between these two physical features. A general description of the physical features in Shewa follows.

+ Many names for the physiographic divisions of Ethiopia have been suggested and applied by various authors. The Tertiary Trappean highlands, for instance, which extend north-south to the west of the Rift Valley, have been given the following names:- The North-West Highlands and High Plateaus, and the South-West Highlands by G. C. Last in his 'A Geography of Ethiopia', 1963,pp. 39; The North-Western Highlands and Associated Lowlands by Masfin Woldemariam in 'A Preliminary Atlas of Ethiopia', 1962; The Ethiopian Plateau by



SOURCE: Ethiopian Government Technical Agency, Ref. No. MA/P.D./SH-66/8, 1967

2. Physical Features

2.1 The Shewan Plateau

Bounded by the Abay and Omo gorges on the north-west and west respectively, and the Rift Valley in the east and south-east the Shewan Plateau forms a large part of the north-south extending Central Highlands formed by the flood basaltic lavas. Except for a small strip of Rift Valley lowland in the east it extends over the whole of Shewa province. On all sides of Shewa, except in the north, the Shewan Plateau drops down considerably in altitude and in the gorges of the Abay and Omo rivers it is succedded by the Basement Complex. In the north, however, its surface is not broken by any river and it continues forther north to join the higher massifs of Semien. It is widest in Central Shewa and narrows to bedome a thin strip of plateau in southern Shewa.

During the uplift of the Arabo-Ethiopian swell two regions of maximum uplift appeared in Ethiopia: 1. in the present day Eritrea, Tigre, Afar and Harer, and 2. in the vicinity of Lake Abaya. The present Shewan Plateau lay in the lower, but uplifted, area between the two regions of greatest uplift. This was followed by extrusion of flood lavas of the Trap Series through fissures along the tension lines in the upwarped crust of the earth. This would probably account for the higher massifs and mountain peaks to the north and south of the Shewan Plateau. The Trap Series attained its great thickness generally everywhere, in some parts of Shewa over 2,500 metres, thus raising the general level of the region. Hence

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a score of authors who call the same plateau as the Central Plateau such as H.P. Huffnagel and Sh. Atnafu Mekonnen. So many names for the same feature is always misleading and some of the above names are

the general height of the Shewan Plateau is over 2,000 metres. Further changes in the landscape of the Shewan Plateau occurred by the extrusion of the Aden Volcanic Series, and by heavy erosion which excavated numerous valleys and gorges. It is evident that volcanic eruptions continued over this region from the epoch of the Trap Series until very recent times. Whilst the denuded volcanoes Yerer, Wachacha and Furi are considered to have been formed at the end of the Trap Series, the perfectly domiform hill of Menagesha, the well preserved Quaternary convex cone of Zuquala, the dormant domed volcano of Chubi, and the very prominent volcano of Fantale in the Awash Valley were all produced during the latest volcanic phase in Shewa. Related to the latest phase of Aden Volcanic Series eruptions are the explosion craters which are not uncommon near the ill-defined western boundary faults of the Rift System.

The northern part of the Shewan Plateau has been deeply dissected by the north-flowing tributaries of the Abay among which the more important are the Guder, Muger, Jema and Wachit. The deep gorges incised by these rivers have carved out isolated, flat-topped, steep-sided massifs, locally called 'ambas', such as the Selale, Merhabte and Menz massifs. These rivers have so actively eroded the lava cap of the Plateau that some have excavated below the basalts into Antalo Limestone and Adigrat Sandstone, and the Abay has even exposed the Basement Complex surface exposed on Mt. Kitar near Wombera.[1] But the eastern part of the Shewan Plateau in northern Shewa is not so deeply dissected. However, inumerous big and small east-flowing streams have eroded extensively the eastern

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liable to severe criticism. It appears to this author that 'Central Highlands' is the most appropriate and unambiguous name for these highlands.

escarpment facing the Rift Valley. Thus to the west of the Abuye Meda-Megezez watershed the river erosion is rather deep, forming several major river gorges and leaving flat-topped 'ambas' which provide formidable natural fortresses against an enemy and gently slopping land for farming. But to the east of this watershed the surface erosion has generally made the land useless for cultivation except at a few places. Also the altitude drops down considerably merging eventually in the lowlands of the Awash Valley. Owing to its location to the east of the Plateau escarpment the rainfall is low. All these factors together make the land more suitable for grazing than cultivation and it marks the beginning of the area of the nomadic Afar herdsmen.

The whole of northern Shewan Plateau is higher than 1,000 metres in altitude and more than falf of it is higher than 2,000 metres. In the river gorges obviously the altitude decreases considerably. The highest summits of the Shewan Plateau are found here. It is also interesting to note that most of these summits are found along the scarp facing the Rift System to the east and the general elevation declines towards the west. On the eastern esdarpment high mountains like Megezez (3,596 m.), Jib Washa (3,124 m.), Woti (3,677 m.), and Abuye Meda (4,000m.) form a continuous mountain chain overlooking the Rift Valley. Abuye Meda is the highest elevation on the Shewan Plateau and is only 620 metres below the highest peak of Ethiopia, Ras Dashan (4,543 m.)[2]. All these conspicuous mountains are composed of the Trap Series basalts and can be seen from far below in the Rift Valley.

The eastern escarpment of the Shewan Plateau abruptly descends at a few huge steep steps, which are the limits and margins of the Rift Valley. At certain places the edge of the

plateau is so abrupt that one may walk almost to the verge of the slopes without suspecting any break in the ground. The descent from the plateau is so sudden that the very sight of it is breath-taking and indeed, as Buxton remarked, "one felt that an absent-minded person might have fallen over it."[3] This plateau edge is in the form of sheer cliffs which are sometimes accompanied by steps and scree cones. Within a small distance towards the Rift Valley the altitude declines from 2,000 - 2,500 metres to below 1,000 metres. The whole length of the eastern escarpment has been heavily denuded by the east-running streams which drain into the Awash river, Kesem being the largest and the strongest among these streams.

The Addis Abeba - Agere Hiwot fault running east-west marks the termination of purely Trap Series basalts, and this also marks the beginning of the tectonically varied region. Some Rift Valley faults in this region have been buried under the more recent lavas. Mts. Wachacha, Yerer and Furi are of later age than the Entoto hills just north of Addis Abeba. The latter are believed to belong to the later Tertiary basalts. Still younger than these mountains is Mt. Zuquala which has a well preserved crater of about 2 km diameter and a depth of 60 metres. The crater is occupied by a shallow lake. Zuquala rises about 600 metres above the surrounding plain. While obviously it is a more recent volcano, it cannot be classed amongst the recently-active volcanoes such as Wachacha, Fantale and Chubi. There is also a line of small basalt cones extending from Zuquala north-east to Debre Zeit. All these mountains, however, rise above the Trap Series basalts.

In southern Shewa the Plateau has been delimited to a small strip by the existence of a linear scarp 150 - 250 metres high extending north-south from north of Sodo towards the Gurage

mountains. Between this scarp and the Omo gorge to the west lies a narrow strip of the plateau of Kambata, which is one of the most fertile regions of Shewa. It has several explosion craters such as those lying along a line of faulting through Kolito river. Besides, to the south of Hosaina on this plateau lies an immense circular depression with a diameter of about 10 kms; the floor of the depression is marked by older cinder cones, and small depressions which may be remnants of old, filled-in explosion craters. The general elevation rises towards north and culminates in the Gurage Mts. which have been formed by an upwarping of the Plateau Trap Series towards the Rift. The Gurage Mts. (3,719 m.) are the highest elevation to the south of Addis Abeba-Agere Hiwot fault and they are only inferior to Abuye Meda in Shewa. The plateau here dips gently towards the Omo gorge, causing the numerous perennial and non-perennial streams to flow to the west into the Omo. Further north the Great Jibata and Gurage Mts. rough alignment, south-east to north-west, serves as the main watershed between the upper Omo on the one hand and the Awash and Abay drainages on the other.

2.2 The Rift Valley

The Rift Valley in Shewa is merely a small portion of the Great Rift System which extends from the Dead Sea to Mozambique. But the fact that it lies at the 'neck' of the 'funnel' of the Main Ethiopian Rift makes it more interesting. The Main Ethiopian Rift runs NNE-SSW through the eastern and south-eastern parts of Shewa. It is narrow in the south and widens to the north, where it separates the Central Highlands from the Eastern Highlands of Ethiopia. Though in south-eastern Shewa the Rift lies almost entirely within the province it extends towards east as far as Dire Dawa in the north-east. Therefore, only that section of the Rift which

falls within the political boundaries of Shewa is described here. Beyond the Meki-Awash watershed the eastern boundary of Shewa follows very closely the course of the Awash river, which rises towards both east and west from the bed of the Awash which for most of the corse flows through abrupt even vertical cliffs. It is also interesting to note that the northern section of the Rift in Shewa is part of the wider section of the Main Ethiopian Rift and it covers only a small strip of step faulted land between the Awash river and the Shewan Plateau. So the total area of Rift Valley in northern Shewa is much less than in south-eastern Shewa through which passes almost entire 'neck' of the 'funnel' of the Rift.

The Rift Valley in Shewa can be more conveniently studies into two major sections: 1. the southern Rift Valley and, 2. the northern Rift Valley. The main watershed between the Awash river and Lake Ziway is the dividing line between the two sections. It should be emphasised quickly that the two divisions of the Rift mentioned here serve only the purpose of this study and should not be applied to the study of the Rift Valley as a whole in Ethiopia.

2.3 The Southern Rift Valley

The southern section of the Rift Valley occupies the basins of Lakes Ziway, Langano, Abiyata, Shala and Awasa. Of these Lake Awasa is the smallest with a total area of 129 square kilometres.[4] Only about one third of the uplifted Lake Awasa basin lies within Shewa in the south. The rest of the water this lake is shared by the Sidamo province. It has a very close geological relation with Lake Shala to the north which it was once joined. These lakes broke away from each other during the post-Pluvial block faulting and tilting. Lake Awasa is unique because it is totally enclosed by faulting, travers rift faults bounding it to

south and north as well. To the north of it lies the dormant domed volcano of Chubi which has extruded several large and very recent flows of lava over the lacustrine sediments around the volcano.

All the five lakes in this region have been called together as the Galla Lakes, probably because they lie in a predominantly Galla region. It is believed that not only Shala and Awasa but all the Galla Lakes were formerly united together as one huge lake during the Pluvial periods. This is proved by the lacustrine deposits of red, yellow and white sands, tuffs, clays and diatomite on the flat, uplifted floor of the Rift Valley in this region. Today, except Awasa, all the remaining four lakes are joined by two streams. Both Lake Ziway and Lake Langano drain into Lake Abayata; Lake Ziway through the Bul Bul river into Lake Langano which is connected by the Horcolo river with Lake Abayata. Lake Abayata also drains into Lake Shala through the Dindo. Lake Shala has apparently no outflow, as the high alkalinity of its waters suggests.

It is interesting to note that the deepest lake of Ethiopia Lake Shala (250 metres deep), and the shallowest natural lake of this country, Lake Ziway (only 4 meters deep), are among the Galla Lakes. The great depth of Lake Shala is explained by the fact that this lake occupies an intensely faulted basin. It appears that all these lakes are shrinking fast and becoming more shallow leaving behind them evidence of their previous extension. The aerial photographs of this region show that beaches of continuously-decreasing sizes encircle Lake Abayata and the land on all sides slopes towards the lake. The land bridge between Abayata and Shala also produce evidence of the shrinkage of these lakes.

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In the southern section of the Rift the eastern scarp is well-developed whereas the western scarp is generally less

developed. The eastern scarp generally lies in Arusi province to the east of the Galla Lakes. This small section of the eastern scarp lies in the region of Shashemene and it is less defined. The western scarp extends less conspicuously through Kambata and develops more fully in the Gurage Mts. Here it has formed a gently sloping plateau between the Galla Lakes and the Omo gorge. In the area between the western scarp and the Galla Lakes are occasional explosion craters and cinder cones. The average distance between the western and eastern faults, where the former is developed, is about 80 kms. In general, the level of the southern part of the Rift rises towards north until it attains its maximum elevation at the watershed of the Meki and Awash rivers at a little over 1,800 metres.

2.4 The Northern Rift Valley

From the Meki-Awash watershed towards the north, the Rift widens and slopes down until eventually it merges into the Afar Depression. It is this slope of the Rift Valley floor which has mostly determined the northerly course of the Awash. The area between the Meki-Awash watershed and the latitude of Addis Abeba ($9^{\circ}00^{\circ}N$) is a complex region. The Rift Valley, the Shewan Plateau of Trap Series and the mountains of the Aden Volcanic Series are very much mixed up in this region. This complicated region lies generally between Nazret and Awash town. It is marked by the volcanic eruptions of Aden Volcanic Series over the lacustrine sediments of the Rift Valley. The cone shaped volcano of Fantale, which last erupted about 1,800 A. D., rises about 600 metres above the Rift floor and its lavas cover a roughly oval area of some 100 sq. kms. in extent. Some of its basalt is so fresh that it has not yet been colonised by vegetation. South and west of Fantale the plains are dotted with swarms of bubble-like features, the cupolas or 'blisters'

some of them 20 metres across and 5 metres in height. They appear to have been formed by gases blowing through the sediments of Lake Metahara which once extended up to the bottom of Fantale. West of this area the Gariboldi Pass is another typical area of very recent volcanic activity. Hundreds of small cones, only some of which have erupted lava, dot the plains in this region almost up to Mt. Boseti Guda to the south-east of Welencheti. However, the Wenji sugar estate is situated on the old lacustrine sediments. Not far away to the west of Wenji the Koka dam on river Awash has given rise to Lake Galilie (250 kms^2 in area and 4-9 metres deep), so far the largest man-made lake in Ethiopia.

But the region to the north of 9.00°N latitude is different. The most outstanding feature of this region are steep cliffs and slopes in a succession of steps from the heights of the plateau to the plains. All along the Awash are large plains which are occasionally swampy. But westwards from the river, the land rises to the Shewan Plateau which is the source of many streams flowing into the Awash. These streams, some of which large enough to be called rivers, bring down water from the Plateau in the rainy season and remain dry for most of the remainder of the year. The lowlands of the Rift are studded with numerous craters, volcanic cones, shallow lakes, swamps and dry basins.

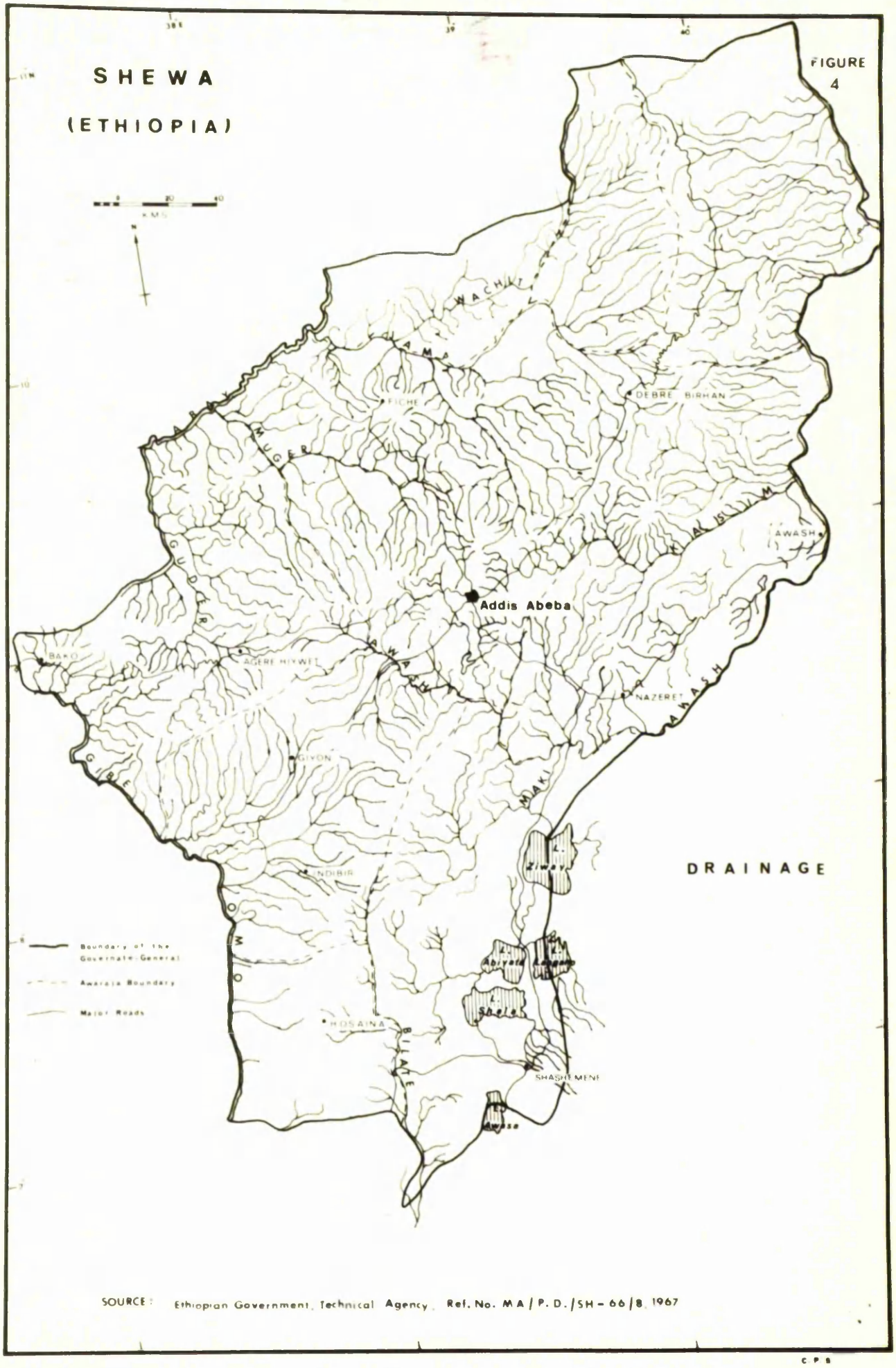
The Rift floor is generally covered with lacustrine sediments, volcanic ash and tuffs. A belt of fossiliferous sediments about 5 kms. wide extends along the Awash Valley from north to south. It is believed that Lakes Gedebasa, Hertale and the swamp west of Azelo volcano in the middle Awash Valley were joined as one lake in the Pluvial periods. A similar large lake covered the region of the present Lakes Lyadu and Cadda Bilen below Ankober.

3. Drainage

Ethiopia has been called as the "water tower of north-eastern Africa."[5] The Abay, or Blue Nile, is the most famous of all the Ethiopian rivers which affect the life of people in the neighbouring countries. A large amount of its water comes from the tributaries which rise in the Shewan Plateau. On the other hand, the Awash which has a great economic potential for Ethiopia, also rises in the Shewan Plateau. Thus in Shewa lie the sources of some of the rivers of national and international significance.

Most of the tributaries of the major rivers of Shewa are non-perennial. They are nearly dry for most of the year, but turn into torrential mountain streams during the rainy season. As a result their use in the catchment areas is very limited. The runoff is fast which only aids in soil erosion. Only some of the rivers are perennial. But most of them are not used for irrigation for various reasons. The Awash is the only major river of Shewa which has been used for large scale irrigation on the modern and mechanised farms. The Abay and its tributaries and the Omo flow through gorges and at the present are useless for irrigation since the cultivated land lies much higher than the water level. As a rule, all the rivers of Shewa are not navigable.

The course of the Shewan rivers has been determined by the general tilt of the Plateau to the west and the existence of the Rift Valley to the east. Most of the rivers, therefore, flow either to the west or to the east of the Plateau into the Rift Valley. The exceptions are the Omo (Gibe), which flows from north to south, and the streams, mostly non-perennial, which flow in the Galla Lakes. It is interesting to note that except the Abay and its tributaries all other Shewan rivers fall in the closed



SOURCE: Ethiopian Government, Technical Agency, Ref. No. MA/P.D./SH-66/8, 1967

basins of lakes in the Main Ethiopian Rift Valley.

Following four drainage systems are found in Shewa:- a. The Abay and its tributaries b. The Omo (Gibe) c. The Awash and, d. The internal drainage of the Galla Lakes basin.

3.1 The Abay And Its Tributaries

The Abay flows only for about 105 kilometres (see Appendix 1) on the northwestern boundary of Shewa, but its catchment area covers about one third of the province. Some of the important tributaries of Abay originate on the Shewan Plateau. All rivers roughly from 30°E longitude westwards and 9°N latitude northwards fall eventually in the Abay. This is the region of about 1,100 mm. annual rainfall and therefore it contributes a great deal to the famous Nile floods. The actual amount of silt lost through these rivers is not known but it is certainly high as is evident from the fact that this the the highest eroded part of the province. It is these rivers which have made a great part of north-western Shewa remot and inaccessable.

The main tributaries of the Abay are: 1. the Jema, about 206 kilometres long, which is the largest of all the tributaries of the Abay. It rises near Ankober in Mt. Woti and passes through one of the least known parts of Shewa. Most of its tributaries originate on the eastern escarpment of the Shewan Plateau and follow the tilt of the Plateau to the west. The strongest of its tributaries is the Wachit which flows for about 138 kilometres in Shewa from north to south. 2. the Muger, which has its headwater just to the north of Addis Abeba. It flows for about 156 kilometres before falling into the Abay downstream from the Abay bridge. It also passes through another least known part of Shewa. 3. the Guder, rising to southwest of Agere Hiwot it flows

for about 145 kilometres from south to north. It is comparatively a smaller river. However, before falling into the Abay it passes through an equally remote area.

3.2 The Omo (Gibe)

The Omo, which in its northern section is known as Gibe, makes the western boundary of Shewa. Its north-south course is determined by the continuation of the Lake Rudolf Rift northwards. The total length of the river is 760 kilometres of which nearly 260 kilometres is shared by Shewa. The river eventually falls in Lake Rudolf on Ethiopia-Kenya border. The Kambata plateau separates its drainage from the Galla Lakes basin rivers to the east. The Great Jibata makes the watershed separating it from the Abay drainage to the north. The tilt of the Kambata-Gurage plateau to the west has produced numerous short and mostly non-perennial streams flowing into the Omo. It flows through a gorge between several hundred metres high plateaus of Shewa and Kefa. It is difficult to cross it in rainy season except at the bridge.

3.3 The Awash

The Awash is a much better studied river. The Food and Agriculture Organisation of the United Nations has produced a five volume report on it covering such topics as hydrology, climatology, irrigation, power development etc.

It rises from Mt. Werqe on the Shewan Plateau, about 70 kilometres west of Addis Abeba, at an altitude of about 3,000 metres above sea level. After flowing for about a third of its course in Shewa it enters the Lake Galilie, a 250 square kilometres reservoir lake which has come into being by the construction of Koka dam. After passing the Wenji sugar estate it makes a loop around Shewa and flows in a northerly direction after Awash town.

Its prominent left bank tributaries upto Awash town are the Akaki and the Mojo. Beyond this town northwards most of the streams coming from the Shewan Plateau escarpment are non-perennial. The Kesem and Kebena are the only strong, year-long flowing rivers. Some of the streams do not even reach the Awash and are lost soon after descending the Plateau.

The Awash is the largest Ethiopian river which flows entirely within the country. It is about 1,200 kilometres long of which about 526 kilometres lie in Shewa. It is the only major river of this province which has been used for irrigation on large, mechanised commercial farms and for Hydro-electricity. All along the river several government and private owned commercial farms are being developed and ambitious hydro-electric projects undertaken which will greatly affect the economy of not only of the people in the Awash Valley but also of the whole nation.

3.4 The Internal Drainage of Galla Lakes Basin

The basin of the Galla Lakes is surrounded by higher land on all around. Consequently, small streams, some of which turn into torrential rivers in the rainy season, flow into all the lakes from all sides. They dry up in the dry seasons. But some of the rivers which are never dry are those which connect these lakes with each other. These rivers came into existence after the gradual uplift of this region which gave time to these rivers to erode their beds and maintain more or less the original course. The name of the rivers which join the Galla Lakes are the Bul Bul, Horcolo and Dindo which have also been discussed in 2.3.

The only exception of the general drainage pattern of this basin is the Kaliti river which originates in the basin but falls in Lake Abaya, another Rift Valley lake to the south. This

river follows a fault line almost all along its course.

Thus, except the Awash, all rivers of Shewa are rarely used for irrigation. Most of the rivers are non-perennial and they are dry or nearly dry for a greater part of the year. Big rivers such as the Abay and Omo are too deep and at the present there is no system to lift water to the high plateau on both banks of these rivers. The commercial farming in the Awash Valley is entirely dependent upon irrigation from the water of the Awash river.

5. CLIMATE

Climate records are insufficient in Shewa province to give other than an imperfect indication of average conditions as well as of the range of temperature, rainfall and other factors of climate, both from season to season and from year to year.

The data which it has been possible to collect are set out in Appendix 7 which have been derived from records off the National Climatological Service, Civil Aviation Administration, Ministry of Communication, Addis Abeba. It will be seen that only five stations, most of which are within 100 kilometres of Addis Abeba, have records for a sufficient period, i.e., for between 9 and 64 years. In fact except Addis Abeba and Debre Zeit all of them have records for less than 12 years. Even this span is less than ideal for the application of statistical techniques. Other have reading for 2 to 14 years, which are often discontinuous and rarely include information for all factors (i.e. for temperature, rainfall etc.) simultaneously.

The situation is better as regards rainfall data which are recorded at 15 stations (Appendix 7) fairly scattered in all parts and on varying altitudes of Shewa. As for the temperature records, the rainfall data are also incomplete and unreliable for some stations. Appendix 4 shows the years and months for which data are incomplete. Though there are only 8 stations for which complete data are available, there are many others which lack figures for a month or two. The latter can be used with a little interpolation referring to more reliable stations nearby, such as Addis Abeba and Wenji, for the relevant year. However, the limited scope (6-13 years) and lack of completeness of the data did not justify

elaborate analysis or the computation of standard deviations or coefficients of variability.

2. Temperature

2.1 The Importance of Altitude

The factor which predominantly determines the distribution of temperature, and to some extent the distribution of rainfall, in Shewa is the altitude. The province lies close to t the Equator between 7° and 11°N and climatic stations at sea level at these altitudes have mean annual temperatures of 31°C (e.g. Berbera in Somalia, 10° 30'N) but temperatures over a greater part of Shewa have been considerably modified due to the great heights of the Shewan Plateau. In contrast, the lowlands of the Rift Valley and the deep river valleys have an uncomfortably hot climate, a fact which prevented an effective control by the Highland governments of the lowlands of the Awash Valley and which also helped the Adals to be isolated from the rest of the world.

Thus the altitude plays a major role in the life of the people who have traditionally divided their lands into three different climatic zones depending upon altitude - 'Kolla', 'Woina Dega' and 'Dega'. 'Kolla' are the lowlands, in altitude from sea level to about 1,800 metres, with an average annual temperature of 21° to 30°C. 'Woina Dega' are the temperate highlands, in altitudes from 1,400 - 1,800 metres to 2,400 - 2,600 metres, with an average annual temperature of 16° to 20°C. 'Dega' are cold mountains in altitudes above 2,400 - 2,600 metres, with an average annual temperature of 10° to 16°C. On the mountain tops, above the 'Dega' zone and where the elevation is over 3,500 metres, is the additional zone of 'Wirch' which is characterised by an 'alpine' climate. All these climatic zones are found in Shewa. Most of the Rift

Valley lowlands and the gorges of Omo, Abay, Guder, Muger and Jema have a 'Kolla ' climate. Except the higher parts of Mts Megezez, Jib Washa, Woti, Gurage and Abuye Meda, which have mostly 'Dega' climate, the whole of the Shewan Plateau has the intermediate altitude and climate of 'Woina Dega' type. It should be noted that the largest number of people of Shewa inhabit this region of 'Woina Dega' which provides them with a comfortable and healthy climate as well as fertile arable land for farming.

2.2 Seasonal Variations in Temperature

In all the climatic zones the seasonal variation of temperature is small, though it is slightly higher in lowland areas. The difference in the mean temperature for the coldest and warmest months at Addis Abeba is only 3°C, while at Debre Zeit it is 3.5°C, at Agere Hiwot 4°C and at Wenji, which is nearly 900 metres lower than Addis Abeba, it is 5°C. This should be clear from the table of figures of average daily temperature of these places (Appendix 3). Data for other stations are incomplete. The lowlands follow the same seasonal variation of the northern hemisphere, i.e., the lowest temperature in January and the highest in June. But the highalnd areas do not necessarily follow the same trend. The hottest months there are May and June, when insolation is great with the sun having just passed the zenith. The coldest are the months which immediately follow July to September, and these are rainy months in which rain, coupled with the decrease of temperature due to the cloud cover, produce low temperature. Nearly all stations in Shewa record a drop of 1 - 6°C in the mean maximum temperature in rainy months as compared to December and January. That is the reason why the rainy season in Ethiopia is referred to as 'Kremt' or winter season. But Awash town, which is the only station in

the lowland areas where records were available, shows mean maximum monthly temperatures 3°C higher in the rainy season compared with December and January, though it is about 3 - 4°C lower than the mean maximum temperature of May and June. The stations of intermediate altitude, such as Wenji, have very similar temperatures both in rainy (July - September) and winter (December - January) seasons with a rise in temperature following these two seasons. However, the temperate 'Dega' areas are very cold in rainy season and generally have frequent hailstorms. But no place in Shewa has snowfall.

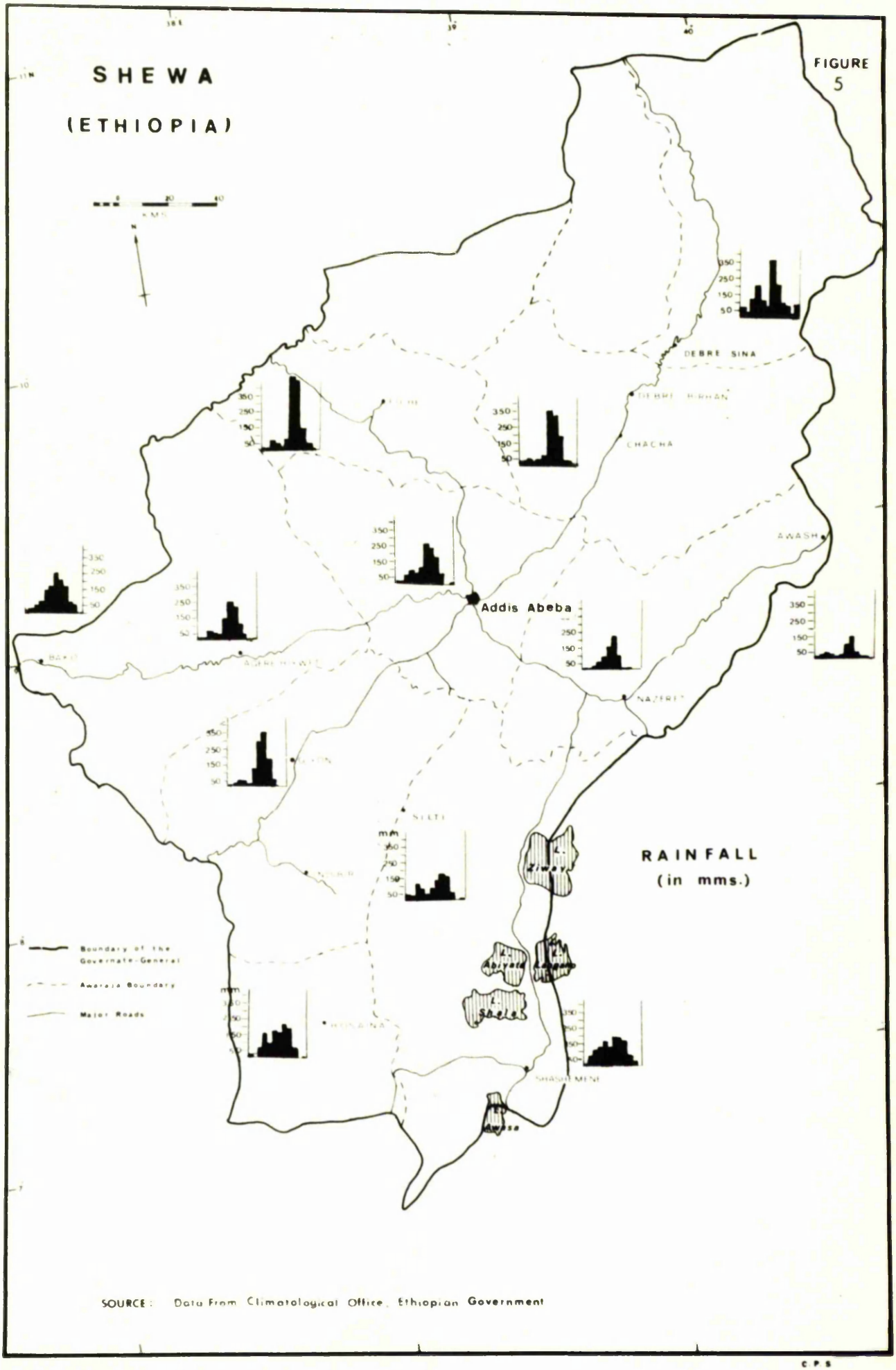
2.3 Diurnal Variation in Temperature

The diurnal range of temperature is quite high on the plateau and lowlands alike. The equatorial sun provides high insolation during the day, which is lost quickly in the night. In periods of clear weather the range of temperature between day maximum and night minimum is sometimes as high as 23°C, as is the case of Hosaina (Appendix 6). But this station is rather the exception than the rule as most of the stations in Shewa record a diurnal range of about 14 - 20°C in the dry seasons. As the figures in Appendix 6 show the second highest diurnal range of temperature is recorded at Awash twon in the northern part of the Rift Valley. But in the wet seasons the cloud cover prevents the occurrance of such high diurnal ranges. Whereas the clouds serve as the barrier for the escaping heat they also act as temporary thermal reservoirs by absorbing heat from below and above them. As a result night minima are higher and day maxima lower; the range may be as little as 6°C. When the cloud cover is lifted during the dry periods the diurnal range of temperature is high again and frost is often experienced at night in the highlands, particularly between November and the end of January.

3. Rainfall

Rainfall in Ethiopia is predominantly the product of the major annual oscillations of pressure and air currents within the neighbouring Sudan and Arabian Peninsula. With the advance of the sun towards the summer solistice the zone of convergence of northerly and southerly air streams, the Intertropical Front, is over northern Sudan and Southern Arabia. The sun is vertical on 15th April at Malakal in Sudan (9° 32' N) which is about half a degree north of the latitude of Addis Abeba. The Intertropical Front reaches northern Sudan by mid-June and the moist air from the South Atlantic is attracted across the Equator. At this time the whole of Shewa experiences the highest maximum temperatures of the year. The general rise of temperature in the neighbouring countries is accompanied by a relative fall of barometeric pressure; and air is drawn from the Gulf of Guinea into southern Sudan. This stream of air gives little rain in Sudan but it is the main source of rainfall over most of Ethiopia. When it reaches the highlands of south-west Ethiopia it rises and gives heavy rainfall. With its approach the season of 'Big Rains' in Ethiopia begins.

The rains spread in Ethiopia from south-west to north-east. This trend can clearly be seen in Shewa, where, with the exception of Debre Sina, the stations located in western part of the province receive higher rainfall than the stations in the east (Appendix 7). Also the rains reach the western part earlier. Stations wuch as Welkite, Giyon, Hosaina, Agere Hiwot etc. receive rainfall by the middle of end of June, while Shashemene and Awash town have it sometimes in July. As the air stream moves towards the north-east it gradually "rains out" its moisture and therefore eastern Shewa has less rainfall. Another reason for the low rainfall


SHEWA
(ETHIOPIA)
FIGURE 5
DEBRE SINA
CHACHA
AWASH
Addis Abeba
NAZERET
SILTI
RAINFALL
(in mms.)
L. Ziway
L. Abiyata
L. Langano
L. Shala
L. Awasa
Boundary of the Governate-General
Awraja Boundary
Major Roads
SOURCE : Data From Climatological Office, Ethiopian Government
CPS

in the Rift Valley is the 'föhn' effect produced by the descending air from the plateau. As a result, eastern Shewa comprising of the lowlands of the Awash Valley receive very little rainfall in the main rainy season of Ethiopia.

It has been noticed that rain falls continuously for several days in the beginning and end of this period with occasionally 8-9 dry days in the middle.[2] During this rainy season the sky is generally clear in the mornings. Rain starts generally around 3 p.m. with heavy thunder, sometimes accompanied by small hails. It is rare for the heavy showers to continue for more than a few hours. The afternoon rain falls from the heavy cumulus or cumulo-nimbus type of clouds.

By September, the sun is vertical over the Equator and with the receding Intertropical Front the rain begins decreasing from north-east to south-west. This is one more reason that the rainfall is more in western Shewa.

Within the period July to September the province receives the highest amount of precipitation. More than half of the total annual rainfall is received in these three months everywhere in Shewa. For instance, Fiche receives 1045.0 mm. of rain in these months out of total annual of 1397.9 mm., and Awash town 345.5 out of 580.2 mm. As has been seen previously the distribution of rainfall is very uneven over the whole of the province. Not only rain varies from west to east but also from valley to valley which are numerous in this plateau country. The windward slopes get higher rainfall than the leeward slopes. Since the direction of wind is generally from south-west to north-east the south-western slopes usually get more rainfall. Records show that Debre Sina gets the highest amount of rainfall in Shewa (1525.9 mm.), though

it is located in the north-east of the procince and lies just below the huge escarpment of the Shewan Plateau, where it is likely to have 'föhn' effect from the south-west winds. Chacha, which is 183 metres higher than Debre Sina and is located on the plateaum facing the rain bearing south-west winds receives only 1046.7 mm. of rainfall annually (Appendix 7). However, it should be noted that the rainfall at Debre Sina is higher in every month and there is more rain there during small rains (Figure 5). In fact, the rainfall at Chacha from July to September amounts to 790.6 mm. while it is 680.2 mm. at Debre Sina for the same period. On the whole, stations in western Shewa have more rainfall. For instance, Welkite has an annual rainfall of 1432.9 mm., Fiche 1397.9 mm., Giyon 1245.0 mm., Baco 1248.5 mm. and Hosaina 1168.2 mm.; while Awash town, Nazret and Wenji have merely 580.2 mm., 785.7 mm., and 799.0 mm. of annual rainfall respectively (Appendix 7 and Figure 5).

In the wake of the receding Intertropical Front the north-east trades become effective at the end of September in Ethiopia marking the termination of the main rainy season and the beginning of the dry season. Also by the beginning of October Ethiopia is dominated by two great anticyclones. One of these is centered over the Sudan, oriented E-W and a second one, oriented N-S, overlies Arabia and projects south into Ethiopia. The dry airstreams moving southward over Ethiopia from the Sudan and Arabian anticyclones result in generally dry weather during the period from October to May.[3]

The dry period is interrupted by a short period of rainfall maximum and occasional rain from cold brusts from north temperate latitudes. This second period of rainfall which usually

lasts two or three weeks, is between the last weeks of March and first weeks of May. In some years afternoon showers continue throughout May and June, and there can be extensive periods of rain from April to September including the 'Big Rains'.

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The above climatic conditions indicate that the climate of Shewa is determined mainly by height and the prevailing south-west winds, and is affected locally by the orientation of the slopes. The lowlands of Shewa have a hot sub-tropical climate, while the Shewan Plateau in general has a cold humid sub-tropical type of climate. The isolated higher mountains on the Shewan Plateau experience a rather temperate climate. It will be shown that this nature of the Shewan climate is reflected in the vegetation of the province and in its agriculture.

6. SOILS

There is a dearth of information concerning the distribution and classification of soils in Shewa, and indeed in Ethiopia as a whole. This is perhaps the field in which scholars and scientists working in Ethiopia have produced least work. Until recently, descriptions of soils were mainly based on some very general works on Africa, mostly by authors who had generally studied the principles of classification and mapping os soils in higher latitudes. The last and most valuable work is by H. P. Murphy, who, probably for the first time in Ethiopia, collected and analysed soil samples from different parts of the country. Owing to the formidable obstacles which the Ethiopian terrain presents he could do no better than to collect soil samples mostly along the roads and railways. He did not attempt to formulate a classification. The principal and most urgent need is, therefore, not only the knowledge of the location and extent of various soil types but also the basic knowldge of pedogenesis in different parts of Ethiopia including Shewa province.

The colour, texture, composition etc. of soils in relation to relief, denudation processes and hydrology greatly influence land use practice and it would seem tempting to apply the Catena concept to soil classification in Shewa. The Catena concept according to its propounder is a "grouping of soils which, while they fall wide apart in a natural system of classification on account of fundamental genetic and morphological differences, are yet linked in their occurrence by conditions of topography and are repeated in the same relationship wherever the same conditions are met with."[1] The Catena, thus, relates landscape development to soil formation. It requires a study of soil sequence from the

top of a slope to the bottom. No such study has been undertaken by soil scientists in Shewa and therefore it would be hazardous to apply the Catena concept, which in fact is primarily within the domain of a pedologist. However, an effort will be made to correlate the existing knowledge of soils with the parent material and climate.

Broadly speaking, there are two main soils regions in Shewa: 1. the plateau soils which are the result of decomposition of volcanic rocks such as basalts and tuffs, and, 2. the alluvial soils depositied by the Awash and its tributaries in the northern section of the Rift Valley. Also, lacustrine soils are found mainly in the Galla Lakes region. It must be realised that the extremely diverse nature of the Shewan Plateau and also of the Rift Valley has given rise to considerable differences in the soils. A number of factors have given rise to local soil differences; the extrusion of lava and the gigantic upheaval accompanying the formation of the Rift Valley; the heavy erosion and weathering which took place in this region leaving immense mountains, valleys and gorges; and the heavy rainfall, which is generally greater on the windward slopes of mountains; inadequate drainage in some areas which causes very pronounced saline concentrations, etc.

2. Soils of the Shewan Plateau

The parent rocks of the Shewan Plateau are types of basalt of varying age. Their chemical composition also varies. The soils derived from lavas are clayey in texture and their colours vary according to their composition. In general, they appear as red to light reddish brown on the mountains and hill sides, reddish brown on the slopes, brown to dark in rolling country and very dark grey to nearly black in the lower lands. The reddish brown to dark

brown soils are excellent for the cultivation of grains. As a rule, the darker the colour, the more compact are the clays. During dry periods they shrink and develop wide and deep cracks. This shrinkage of soils is very important for it is during dry periods that the residue of crops and other vegetation is trapped in cracks. When the rain comes, the surface crumbles, burying the organic matter within a few inches of the surface. On the other hand, in the dry season the cracks sometimes expose the roots of crops, which is harmful to them.

The soils of the Shewan Plateau are located in a region which has two distinct periods of rainfall maxima with variable intervening periods. The main period of rains is the "Kremt", from the middle or end of June to the middle of October. The second period, which usually lasts for two to three weeks, is between the latter weeks of March and the first weeks of May. November is generally an extremely dry month. Thus the soils are quite moist during and immediately after the rains and provide sufficient moisture for either planting or maturing of the crops if they are already standing.

The soils between Addis Abeba and the Omo (Gibe) river are shades of grey or brown on the knolls and on the steeper slopes the soils are red or reddish brown. Near Teji village, about 27 kilometres along the highway west of Addis Abeba, lies the Teji swamp. Flood water stands on much of this somewhat flat plain in the rainy season. But the water recedes in the dry season and crops are planted. The nearly flat and more poorly drained land is in grass and is used for grazing. The soils in this area are mostly dark grey to nearly black clay. Most of the soils are slightly acid to neutral and they are rich in available potassium and calcium. Between the Awash and the Omo reddish brown, brown and grey-black

clayey soils are found. Ensete or false banana is grown around all the dwellings in this area.

Between Addis Abeba and Agere Hiwot, the area is generally hilly or gently-rolling. The soils are generally clayey and are red to reddish-brown, dark grey to dark grey-brown in colour. Soils between Holetta and Menagesha nursery and around Agere Hiwot are black clays which have a high degree of swelling and shrinkage. The black clays have an organic matter contant between about 1.25 and 2.00%. Beyond Agere Hiwot up to the Gibe river the terrain is hilly or mountainous. The general texture of the surface soils is sandy-clay loam to clay. The lowlands in this area have defective drainage.

The area between Addis Abeba and the Abay has a topography varying from nearly level plains to mountains. The lowland soils are dark in colour, while brown to reddish-brown soils are found on the hilly or mountainous slopes. Many of these soils are stony clays and are mostly under cultivation. They are also moderately to strongly-acid, and are also deficient in available phosphorous, potassium and calcium. According to Murphy, about twelve percent of the soil samples of this region were also found to be deficient in total nitrogen and twenty one percent in organic matter.

The area from Addis Abeba to Debre Sina serves as the watershed between the Abay and the Awash drainages. The tributaries of the Abay have developed extremely deep gorges within the high plateau. Occasional flat-topped 'ambas', which have low temperatures and attract high precipitation, are found in this region. Higher peaks are also encountered. To the east the Awash drainage system, at a much lower elevation, has actively eroded this region.

The soils to the east of the plateau escarpments are little known. The watershed area between Addis Abeba and Debre Birhan consists of rolling plains. The soils here are mostly clayey and the sub-soil is commonly a tough to plastic clay which has a poor internal drainage. Generally, the top soil is shallow and is often only from 10 to 20 cm. deep. These soils are generally stony. When they are moist they become very dark-brown. They are deficient in available phosphorous. Most soils have a pH value of 6 or less. Terraced cultivation is generally practised on the slopes. The hillside soils vary from sandy loam to clay in texture and are usually stony.

To the south of Addis Abeba as far as Mojo, the topography varies from nearly level to rolling, with many hills and volcanic cones of various size. The lowland soils are dark-coloured clay while the hill slopes are often reddish-brown. The lowland clay of this area has high swells when wet and shrinks during the dry season when cracks from two to ten centimetres in width appear. Organic residues fall into these cracks and when the rains come this material is trapped. This causes the entire profile to be uniform for considerable depth. This soil also ploughs into large chunks which allow water readily to enter. The immediate surface may dry out, but, just below, the soil remains quite moist. As a result these soils contain the necessary moisture for teff and wheat long after the big rains. At the planting season for teff and wheat these soils are wet. Heavy machinery cannot then be used. At this time, this black land can be worked only with oxen.

Unlike the black clay soil of this region, the

lighter grey soil does not crack. Being friable it is much easier to work. It varies from a sandy loam to clay loam and sometimes has a greater organic content than the black soil. It is usually better drained. The nitrogen content is much lower in the black clay than in the lighter grey soil where erosion has not been severe. However, both of these soils are well supplied with available potassium, calcium and magnesium. Both of these soils are best suited for their present use of grain production, including teff.

The area to the east of Addis Abeba consisting of the Yerer-Kereyu highlands lying between Mojo and Sandafa have medium-brown to very dark grey or black soils. They are almost entirely clays or clay loams. Some are stony. Erosion is severe because of the terrain which is rolling to hilly with numerous valleys throughout the area. As a result, the soil profile varies from the very shallow to the very deep. A very high proportion of land is under cultivation for wheat, barley and teff.

In Hosaina area, another ensete region, the soils are brown to dark grey loam to clay loam or clay. They are moderately- to strongly-acid and generally have a pH value of lower than 6.0. Wheat, barley, teff and coffee grow well.

3. Rift Valley Soils

The portion of the Rift Valley taken into account in this study includes the low, dry alluvial belt along the Awash river beyond the Awash town to the eastern flanks of the Shewan Plateau, and the 'neck' of the 'funnel' of the Rift in south-eastern part of Shewa. Therefore the Rift Valley soils could be discussed in two sections: 1. the northern section and, 2. the southern section.

3.1 The Northern Section

The piedmont steps and also the Awash Valley+ have been covered with materials eroded from the Shewan Plateau and with recent volcanic outflows over alluvia, which have been rapidly covered with fresh alluvium. Thus the distinctive feature of this region is its alluvium, including boulders, gravel and loam with intervening miscellaneous volcanic rock bars of varying thickness.

Tuff, volcanic ash and material from the volcanic rocks are found between Mojo and Nazret. The area is hilly, rough, badly-eroded and has little agricultural value. Overgrazing has further aggravated denudation. The soils in general are shallow, stony and poor. However, some of the medimm brown, stony, sandy clay loam soil on the hill slopes is in cultivation. Natural vegetation cover consists of thorn bush, acacia and grass.

The Wenji plain lies to the south of Nazret. For a long period this plain was subjected to annual inundations which led to the accumulation of layers of fine weathered volcanic soils from the plateaus. These soils are predominantly black. Brown soils are found in higher areas where drainage is favourable. The soils of the plain have a humus content of between 0.5 and 3.3% and a pH value of about 6.8 to 7.06. They are rich in calcium, magnesium, phosphorous and potassium.

From Nazret to Wolenchiti the soils are grey to brown loams and clays. Much of the land is under thorn bush, acacia and grass while other land is used for cultivation. A large part of

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+ The area which lies between the escarpment of the Shewan Plateau and the Awash river, to the north of the Awash town, and which is inhabited by the Adals is popularly known as the "Awash Valley". It is in this sense that "Awash Valley" has been used in the rest of the text.

this area has a pumice horizon in the subsurface from 20 to 60 cm. in depth. These soils are predominantly neutral or moderately alkaline. About three-fourths of the soil samples taken in this area had an organic content exceeding 2%.

Between Wolenchiti and Awash town there is very little cultivated land, except the Metahara sugar plantations. The soils, when dry, vary from pale brown-gray to brown. Basalt outcrops emerge here and there. West of Metahara, Lake Beseka has produced a large circular patch of saline and of saline-alkali soils. The lake is fed by waters from very saline hot springs and run-off.

To the north of the Awash station the low-lying plains and piedmont areas to the west are covered with alluvia and colluvia produced by erosion and weathering of the basaltic rocks. Sediment recently deposited by the Awash covers a strip varying in width along both banks of the river. It is narrow at first and widens towards the north. Very eroded older alluvium with a saline calcareous crust forms steep, nearly barren land, extending beyond the Gewani swamp along both banks of the Awash.[5] This has no agricultural value but is used for grazing. Innumerable tributaries of the Awash, descending from the Shewan Plateau have also contributed to form these plains in the Rift Valley. Some of them have deposited large detrital fans. The Kesem and Kebena rivers have abandoned innumerable stony beds upstream. Some torrential tributaries such as the Gesano, Kokai, Adendaba, etc. disappear beneath their own deposits as soon as they enter the plain. Warm springs due to volcanic activity in this region have contributed to the salinisation of some alluvial deposits along the river.

Plate 3.1 Soil erosion on the plateau north of Debre Birhan

3.2 Soil erosion on undulating plateau near Welkite

3.3 Tukuls and ensete in Gurage area. Notice the sheet erosion up to the ensete plantations

3.4 Soil erosion in Kembata along the banks of Bilate river.

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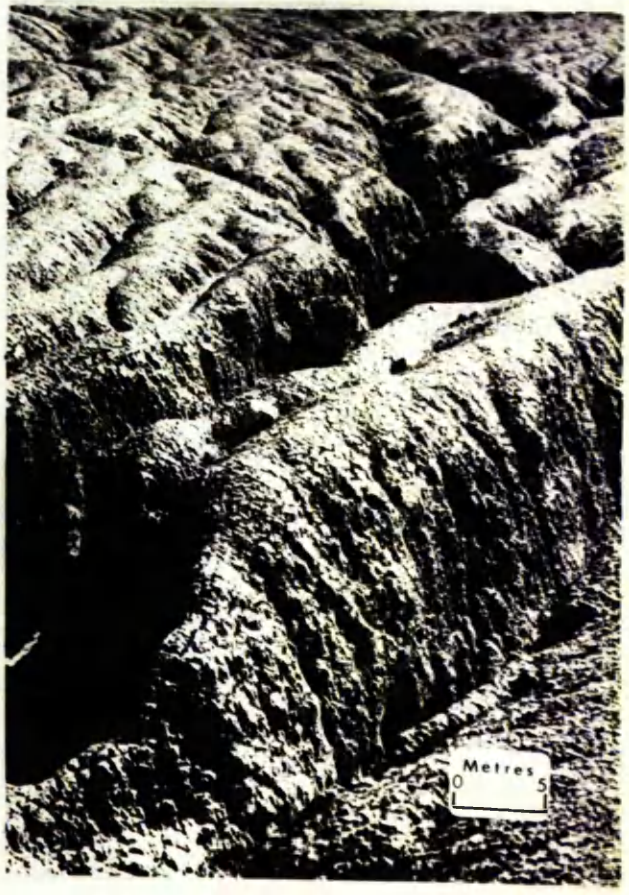

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The alluvial soils of this area generally contain little or no lime, and their pH varies between 7 and 8. They have a swelling clay content of over 35% and are dark in colour, varying from black to brownish-black with a moderately fine texture. The clay has self-mulching properties like the dark coloured clays of the area between Addis Abeba and Mojo.[6] The soils here also have a tendency to form a loose granular surface mulch as a result of wetting and drying.

In the swampy areas soil colour is dark and the organic content is high. There are no natural outlets for surplus water. A large portion of this land is used as pasture except during floods.

There are numerous volcanic cones overlooking the plains. Their soils are usually shallow, with scattered basalt rocks on the surface. The largest of these is Fantale. The soils have no agricultural value but the land locally might be used as wild life reserve.

3.2 The Southern Section

In the Galla Lakes region, to the south of Mojo towards Sheshemene the soils vary in texture, from sandy loam to clay loam or clay. A loose grey volcanic tuff subsoil occurs in places to the south of the Awash river. In some of these profiles, the material may be partially cemented or compacted in the lower subsoil, which hinders root penetration. As a result much of this area is uncultivated. These soils have a plant cover of short grass mixed with scrub bush, dwarfed to tall acacia trees and under-growth. There are, however, some cultivated areas.

In the Sheshemene area, the grey-brown to dark-brown soils are extremely loose, light and have a porous pumice

zone in the profile. The pumice horizon extends widely over this area. Its thickness varies from a few ~~centimetres~~ inches to as much as several feet. The dark pumice horizon is underlain by clay loam or sandy clay loam, lighter in colour. These soils are moderately- to strongly-acid and have a high content of organic matter and total nitrogen.

6. VEGETATION

1. Introduction

Immense variations occur in the vegetation depending upon the variety of geomorphological, edaphic and climatic characteristics. It has been seen in the previous chapters that in Shewa altitude ranges from about 1,800 metres in the Awash Valley to over 4,000 metres in Abuye Meda; in climate from a cool and temperate on the plateau to a hot and dry in the lowlands; and in soils, vertisols derived from the basalts and tuffs to the alluvial soils formed from very cross-bedded recent alluvia along streams and natural water channels. Depending upon these factors the vegetation reflects a great diversity. Whereas the sub-desert trees and succulent scrub grow in the semi-arid lowlands of the Rift Valley, the afro-alpine plant communities thrive over Abuye Meda, Wochacha, Gurage etc. In between are the various types of vegetation.

The original vegetation has been greatly altered at various places owing to the interference of man with the natural pattern, and, therefore, uniformity of vegetation, particularly on the highlands, is not generally found. Man is principally responsible for major changes in the type and distribution of the vegetation, both in the past and at the present day. Heavy deforestation has occurred extensively for cultivation for wood for charcoal and for eucalyptus plantings, etc., leaving little of the original aspects of the highlands, while in lowlands overgrazing and burning have changed the vegetation pattern.

The knowledge of the flora in Shewa is still very scanty. It is chiefly based on general descriptions of the main formations. Pichi-Sermolli has attempted a geo-botanical study of eastern part of Africa, based on his own field-work and descriptions

of botanists or travellers since the last century. His classification of the vegetation of this region has been adapted for the description of the vegetation of Shewa. He classified the vegetation of Eritrea, Ethiopia, Somalia, and the islands of Socotra into 24 categories,[1] of which the following are found in Shewa.

2. Vegetation Types According to Pichi-Sermolli

2.1 Subdesert Trees Succulent Scrub

The sub-desert trees and succulent scrub grow in a narrow belt along the eastern flanks of the Shewan Plateau. This type of vegetation consists of a very open assemblage of shrubs and undershrubs with scattered trees. The trees are widely spaced and attain a maximum height of 6-7 metres. They grow in isolated, scattered groups. The leaves are small and succulent, and they are found on the extreme ends of the branches, which are also few. Bushes are 1-2 metres high and are usually scattered in small colonies. The most abundant species are Euphorbia pilulifera, Capparis persicaefolia, Aloe abyssinica, Cissus quadrangularis and species of Dracaena.

2.2 Broken Xerophilous Open Woodland

This is an open vegetation constituted of wood plants. The big trees are 3-5 metres in height and they do not have any definite size of the trunk. Between the trees widely spaced perennial grasses are found. On the ground, which is left uncovered, annual small plants grow after the rains. Shrubs and trees, however, are much more frequent. The vegetation differs with the soil types. Upon the stony and rocky hills the vegetation consists mostly of succulent species of well-spaced undershrubs, shrubs and scattered small trees. Some deciduous trees with small leaves are also found. Euphorbia is common, with species of Aloe, Caralluma, and sometimes Dracaena and Sanseveria.

The drough-resistant trees and shrubs include species of Acacia (A. spirocarpa, A. mellifera), Balanites, Barbacenia, Aerva, Acalypha, Barleria, etc.

This vegetation covers a large area in the Awash Valley to the north of the Awash town. It provides temporary pastures for the cattle of the nomadic tribes. The density of the vegetation in this area depends upon the intesity of grazing.

2.3 Xerophilous Open Woodland

The characterstics of this type of vegetation remains fundamentally the same as that of the broken xerophilous open woodlands. The difference mostly lies in the density of trees and their floristic composition. The xerophilous open woodland is an arid to semi-arid type of woody vegetation distributed over large areas in the Awash Valley. It consists of 3-5 metres high short-stemmed, multi-branched shrubs, sometimes forming small thickets and umbrella-shaped trees upto 8 metres in height.

The open areas between the shrubs and trees are dotted with tufts of perennial Graminaceae, leaving spots of bare soil covered with annual grasses and herbs only after the rains.

The dominant species are that of Acacia etbaica, accompanied with other species of Acacia, such as A. verek, A. mellifera, A. orfota, A.spirocarpa. Species of Combretum, Terminalia, Euphorbia, Balanites aegyptiaca, etc.,also grow.

2.4 Montane Evergreen Thicket And Scrub

The montane evergreen thicket and scrub consists of dense stands of scrubs and small trees and climbing plants. It grows on the upper slopes of the eastern escarpment of the Shewan Plateau, passing through the higher elevations west of Addis Abeba up to Kambata. In Kambata, a large tongue of the montane savanna penetrates through the belt of the montane evergreen thicket and scrub dividing it into

two major belts extending north-south. This vegetation is found growing at between 900 and 1,000 metres altitude. It, however, varies from region to region and may be found at a maximum altitude of 1,800 to 2,400 metres.[3]

On the lower altitudes the montane evergreen thicket and scrub develops into the form of a scrub consisting of many shrubs and a few small trees, seldom exceeding an average height of 5-6 metres. On the other hand, at higher altitudes, it is represented by a dense thicket of huge shrubs and of many small trees, overgrown by scattered, single or groups, of higher trees. The diversity of plants is great with various shrub species, such as, Acokanthera schimperi, Rhamnus staddo, R. deflersii, Gymnosporia serrata, Carissa edulis, Rhus retinorrhea, R. glaucescens, and species of Grewia etc. The Lianas and other climbing plants are in abundance. Other rampants, such as, Pterolobium stellatum, Chasmanthera dependens, Clematis glaucescens, C. simensis, Cissus quadrangularis, Gloriosa abyssinica, etc. are also found.

The most xerophilous subtype of this vegetation is represented by stands of Euphorbia abyssinica growing on stony, dry slopes and being in close relation to the Acacia forest. The Euphorbia stands form a large and dense growth of an average height of 8-14 metres at several places.

The dense thicket on the higher altitudes is believed to be remanants of the highland forests in the remote times. Now, this is a mixed farming region with cultivation on the hillsides. In the depressions, owing to seasonal waterlogging, there is only grazing.

2.5 Savanna (Various Types)

The savanna can be defined as a tropical formation

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constituted of grasses generally xeromorphic, including Graminae and Cyperaceae as principal components, forming a continuous layer of about 80 cm. height which dominates a lower storey. The savanna in Shewa are found upon more elevated lowlands, plains and slopes in altitude upto 2,000 metres. The largest extension of these grasslands is found in the Galla Lakes region. They extend from the Awash Valley southwards between the Shewan Plateau in Kambata and the Arusi highlands to the west.

From Lake Awasa the Rift Valley floor rises gently up to the Meki-Awash watershed. With the varying altitude, and difference in rainfall, the grass vegetation is not the same everywhere. The grasses prevailing in this area are Cenchrus ciliaris, species of Chloris, Hyparrhenia, Heteropogon, Setaria, Sporobolus, Aristida, Eragrostis, Brachiaria, Pennisetum, Bothriochlora, Panicum and also Hetropogon contortus.

In the Galla Lakes region there are extensive stands of Acacia and Euphorbia, at certain places mixed with each other. From Mojo onwards across the Awash river it is evident that until quite recently the whole country was covered with Acacia forest. This has decreased considerably under the onslaught of charcoal burning. The more common species of Acacia here are A. etbaica, A. seyal, A. albida, in association with Balanites aegyptica, Dobera glabra, Cadaba farminosa, etc.

Immediately west of Sheshemene, in the pumice zone area, large Euphorbia are very prevalent. They are also found in other localities, especially in the Lake Shala area along the highway north of Sheshemene. Around the southern end of Lake Langano Euphorbia candelabrum is conspicuous.

Owing to the availability of wide range of grasses and

pasture plants, the savannas have extensive areas which are heavily grazed.

2.6 Montane Savanna

The montane savanna differs from other savanna not only in physiognomy but also ecologically and in floristic composition. It consists of grasses of 30-80 cm. height including Graminae and Cyperaceae. Numerous perennial herbs in which bulbous and rhizomatous species are in abundance. The most common grasses are species of Pennisetum and Hyparrhenia, as well as Exotheca abyssinica, Heteropogon contortus, and Andropogon abyssinicum.

These grasslands are found in the 'Woina Dega' region from 1,800-2,000 metres upto a maximum of 2,600-2,800 metres. But the montane savanna also exceeds this limit in certain areas and grows in 'Dega', but never above 3,000 metres. Most of the Shewan Plateau to the north of the latitude of Addis Abeba is covered with montane savanna. As stated previously, a narrow belt of montane savanna extends over the higher latitude in southern Shewa over the western slopes of Gurage Mts. up to Kambata. Owing to the very broken topography, the landscape varies from open, treeless undulating country, or scattered savanna, to a woodland vegetation type.

Wherever the land can be tilled, there is cultivation. With the introduction of Eucalyptus, the natural vegetation appears to have disappeared from the Shewan Plateau. However, trees belonging to this vegetation type may be found around churches and villages. The more common are: Acacia abyssinica, Hagenia abyssinica, Pygeum africanum, and Gymnosporia sp., and sometimes Juniperus procera.

2.7 Montane Dry Evergreen Forest

These forest grow in altitudes of 1,800 to 2,300 metres in drier areas, though in humid regions they may extend upto 2,600

metres. They are found in places where the annual precipitation is 1,100 to 1,300 mm. with prolonged dry periods. The main characterstics of these forests is the compactness by which the forest maintains its humidity by itself throughout the year. Originally, they completely covered the plateau in these altitudes of 'Woina Dega'. But after land clearing and forest exploitation, they have generally been forced back to the rather inaccessible mountainous escarpments of the plateau.

The virgin forests are multistoried. The upper canopy is formed of tall trees, generally not much uniform and not compact. The trees are, however, denser at the top forming a continuous layer. The intermediate lower storey of small trees and tall shrubs. The ground is covered with a layer of small shrubs, herbs and grasses. Epiphytes and parasitic plants are well represented in these forests, and numerous lianas clothe the trunks of the high trees.

Depending upon the availability of moisture, there are about four types of the montane dry evergreen forests in Ethiopia. Their most arid aspect is represented by Acacia Xerocarpa forest; while the most humid type by Pouteria forests. Both these extremes are not found in Shewa. But they are well represented by the Podocarpus and Juniperus forests, though at certain places a mixture of both of these forests is also found.

Podocarpus Forests:- These forests are found between 1,400 and 1,800 metres altitude in Sheshemene area, on the extension of the Chercher mountains into Shewa in Lake Langano area, and in northern Shewa. Podocarpus gracilior is the dominating flora. It forms a more regular, almost close canopy. The intermediate storey in its typical aspect is, therfore, not very rich and dense. It is constituted of Pygeum africanum, Ekebergia ruppelliana, Olea hochstettri, Celtis kraussiana and Polyscias ferruginea. In the drier parts

Juniperus procera and Olea chrysophylla are also found.

Juniperus Forests:- The Juniperus forests have their main quarters in the upper, cooler, subhumid parts. They are prevailing mostly in areas with 2,200 to 3,200 metres in altitude. In general, these forests have an upper storey consisting of 30 to 50 metres trees of Juniperus procera, forming a broken, irregular canopy. The intermediate storey of 10 to 20 metres height, consists of Apodytes acutifolia, species of Cussonia, Ekebergia rueppelliana, Milletia Ferruginea, Olea chrysophylla, Pittosporum abyssinica, Rapanea , etc. The development of the lower storey depends on the density of the intermediate storey. Where the latter is not very dense, the lower storey is very rich and generally consists of Maytenus undatus, Ephedra elta, Carissa edulis, Dodonaea viscosa, Rhus abyssinica, Scherbera alata, Heria insignis, Calpurnia subdecandra, Vernonia amygdalina, Catha edulis, Euclea schimperi, etc.

On the Shewan Plateau one can find magnificient forests of Juniperus procera, of which examples are near Addis Abeba on Mts. Wochacha and Managasha, and also near Asebe Teferi and Ankober. In some places on the higher altitude one can find Hagenia abyssinica in abundance on the margin of these forests.

Juniperus procera and Podocarpus gracilior Forests:- On the Shewan Plateau a mixture of Juniperus and Podocarpus forests grows on the intermediate altitude. The upper storey consists entirely of Juniperus procera and Podocarpus gracilier. It dominates the intermediate storey of Olea hochestetteri, Schefflera abyssinica, Albizzia schimperiana, Polyscias ferruginea, Teclea nobilis, etc.

2.8 Alti-montane Scrub And Steppe

This vegetation is found on high mountains and elevated massifs. Grasses consisting of Rapanea, Otostegia steundneri,

Athrixia rosmarinifolia, Myrsine africana, Sparmannia abyssinica etc. The grasses resemble those of montane savanna. In Shewa, this vegetation clads the tops of Mt. Wochacha(3340 m.), Mt. Managesha (2924 m.), Mt. Zuquala (2946 m.), etc. The scrub essentially constitutes of isolated specimens of Erica arborea. The alti-montane scrub and steppe serves as a transitional zone between the montane savanna and the Afro-alpine formations.

2.9 Afro-Alpine Formations

The Afro-alpine vegetation consisting of Lobelia rhynchopetalum is represented over Mts. Gurage and Wochacha, and the high eastern rim of the Shewan Plateau between Ankober and Debre Sina at an altitude of over 3,000 metres. Lobelia rhynchopetalum is generally followed by Erica arborea and carex monostachya. Common species of Graminaceae are Festuca, Agrostis, Poa, and others. The knowledge of this type of vegetation is still limited.

2.10 Riparian Formations

Along the courses of permanent and seasonal water courses riparian vegetation is found. It has a very different composition and luxuriance and depends chiefly on the amount of water available. Where the river flows in the rainy season only, we have a vegetation which, although richer than that of the vicinity, clearly shows xerophilous features. On the contrary, where the water runs permanently and is abundant, the vegetation shows great luxuriance. The presence and the amount of water, together with the substratum are, morever, responsible for the breadth of the strips of riparian communities and the transitional vegetation behind them, which lie all along the river.

In the Awash Valley the riparian vegetation is found all along the river north of the Awash town. There the

trees are Acacia albida, A. etbaica, Balanites aegyptiaca, Combretum sp.; the big bushes and shrubs are Capparis persicaefolia, Cadaba sp., Pterolobium exosum, Carissa sp., Gymnosporia sp., Euphorbia pilulifera, Tragia mitis, etc. The high and low ground cover consists of Sanseviera guineensis, Eulophia petersii, Avera lanata, Sesbania sp., Chloris sp., Eleusine sp., Cyperus sp., Plumbago zeylanica, etc. Climbers are represented by Cissus quadrangularis, Asparagus sp., Cardiosperma sp., Sarcostemme viminale, etc.[8]

We can find the riparian assemblage also on the coasts of some lakes. In Lake Ziway region, in permeable alluvial terrain which is rich in humus, the forest is dense and floristically rich. Some of the species present in this forest are: Ficus vasta, Acacia albida, Phoenix abyssinica, Euphorbia abyssinica, Carissa edulis, Acokanthera schimperi, Motandra erlangeri, Toddalia sp., etc. Around Lake Langano Cyperus papyrus, Typha angustifolia is association with Pycreus mundtii are found near clear waters.

2.11 Swamp Formations

Marshes and swamps are few in Shewa. They are found along the course of the Awash river; in the upper course, such as the Teji swamp about 30 kilometres west of Addis Abeba and the swamp near Lake Galilea; and a few other small swampy areas along the river in the Rift Valley. Swamps in the upper course of the Awash are formed as a result of water-logging during the rainy season. The water level in these swampy areas recedes during the dry season, and land surrounding the swamp is generally braught under cultivation. But the swampy areas in the Rift Valley are water-logged throughout the year. Though some water is lost through evaporation, fresh water accumulates on the surface every rainy season which stays on

for some months.

The swampy vegetation is represented by the aquatic plants which have roots in the soil. Their extension is small. In the central part of some swamps, vegetation chiefly represented by free floating water plants or fixed aquatic plants of deeper water is also found.

The vegetation of the swamps, at several places, has the same formation as that of the riparian vegetation. The typical vegetation of the more or less permanently inundated marshy areas are species of Phragmites, Typha, Vetiveria, Cyperus and Junous, etc., but on the edge of the swamps there are a number of good and palatable grasses.

Also along the shores of the Galla Lakes swamp formations are found with Aeschynomene elaphroxylon, Cyperus papyrus, Huncus sp. and Scirpus sp.

7. POPULATION AND ETHNIC GROUPS

1. Introduction

The difficult terrain, illiteracy, superstition and suspicion among the people about counting the number of people, lack of trained personnel and necessary finance are some of the reasons why Ethiopia is one of the countries which has never had a population census. Therefore all the population figures which are available are mere estimates, including those for Shewa. Even the figures of population in the latest report on a survey of Shewa by the Central Statistical Office of Ethiopia[1] are nothing better than good guesses. Through the effort of the Central Statistical Office the situation has somewhat improved but accurate data of the population of Shewa will not be available for some years. This particularly applies to the data concerning rural population. The data for the urban population are more accurate as most of the towns of Shewa which have been recently surveyed were accessible and the urban influence changed the attitude of the people towards counting the number of people. So whereas the data of urban population can be used with some degree of confidence the figures for rural population should be treated as only informed estimates.

In solving the problem of reliable data for rural population the aerial photographs of Shewa could be of immense help. There is a very good quality photographic coverage at 1:50,000 and 1:25,000 scales of almost the whole of the province. The 'tukuls' or huts can be counted from the aerial photographs and a fairly good estimate of the rural population be made. But it needs a supporting field-work in the rural areas about the approximate number of 'tukuls' used by a household. The housing pattern in the countryside shows that all the 'tukuls' are not used for

dwelling purposes. Some of them are also used as barn and cattle sheds. It would be rather be impossible to distinguish the 'tukuls' used for dwelling from the others. Not only the average number of 'tukuls' per household but also the average number of persons in a household should be known. Without this supporting data the aerial photographs could not be of much use in estimating the rural population. Therefore the author has refrained from making his own estimate of population from the aerial photographs.

2. Distribution of Population

Shewa, the fifth largest province of Ethiopia, has the highest population in the country. Even after disregarding the high urban population of Addis Abeba (644,200)[2] the rural population of Shewa is only about 70,000 less than the rural population of Hararge which is the largest province of Ethiopia. Certainly Shewa has the highest urban population of 854,911[3] in its 53 towns+, which is 21.5% of the total urban population of Ethiopia. The total population of Shewa, however, is 3,970,300[5]. It has an average density of population of 39 per square kilometre, excluding the population of Addis Abeba. Only the province of Arusi, with a density of 47 persons per square kilometre, has a higher density of population than Shewa.

+ The Central Statistical Office of Ethiopia has not used any strict definition of town in compiling the list of these towns. Some of the "towns" included in the list have even less than 200 population. It has been explained that the towns included in the list are those which have "town chiefs appointed within the frame work of administrative authority". However, it should be mentioned here that the definition of a town in Ethiopia is different than many parts of

The reasons for such a high density of population, is that Shewa provides a relatively comfortable temperate climate, large level plateau land, volcanic soils, and previously, even security from an enemy attack as it was cut off by river canyons in the north-west and west and by the plateau escarpment in the east. It was vulnerable to attack from north and south through which came the different tribes which now live on the Shewan Plateau. The other reason which has led to the relatively high Shewan population , particularly in larger urban areas, is the attraction of the countryside people from all provinces to the towns which are the nuclei for modernisation providing them opportunities of work and better recreation. Also the towns have attracted an alien population of foreigners.

Except a very small population of the nomadic tribes of the Awash Valley most of the population lives on the Plateau. The density of population varies from place to place, such as the lower parts of the valleys are generally less inhabited than the uplands which provide security not only from an enemy but also from the annual floods. The 'ambas' of Menz and Merhabete are always highly populated than the deep valleys below them. The aerial photographs of this deeply eroded area with river valleys flanked by abrupt cliffs of 'ambas' show the extent of uneven distribution of the population in this area. For instance, it was found that in the 121 square kilometres area covered by an aerial photograph[6] of the Wachit river valley there were about 693 'tukuls'. Almost

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the world. According to an Ethiopian geographer, "within the Ethiopian context a town is any agglomeration which, irrespective of its size, has more than one-half of the ecomomically active population engaged in non-agricultural activities and where there are permanent variety shops, drinking house restaurants and at least a weekly market."[4]

all of them were away from the river bed and the nearest 'tukul' from the river was about 3 kilometres away. Besides, most of the 'tukuls' were located on three rather flat, higher massifs in a few clustered groups covering about 10 square kilometres of area in all. The rest of the area had no settlement, though it was used for farming and grazing. This trend of distribution of population is found in the whole of the catchment area of the tributaries of the Abay. Similar pattern of population distribution is found in Gurage-Kembata region where, though the rivers have not eroded as deeply as in the northern part of Shewa, most of the population is found living on the higher part of the undulating plateau. However, the population is more evenly distributed in this region. But the most even distribution of population is found on the plateau surrounding Addis Abeba. People generally live in scattered homesteads, with a group of families living together. The landscape appears to be dotted with these dispersed clusters of dwellings.

The people of the Awash Valley+ are nomads or semi-nomads. It is difficult, at the present, to tell their exact number. They are scattered in the Awash Valley in small groups of kinsfolk living together. Since they are mostly on move even the aerial photographs of this region are not much of use in estimating their number. According to an estimate of the Ethiopian Mapping and Geography Institute their population is about 8,000.[7] It is not known how this estimate was made. However, another estimate puts their number to be somewhere between 25,000 and 70,000.[8]

According to the Central Statistical Office, Kembata has the

+ Kembata was part of the Arusi province and once covered the whole of the present southern Shewa.

highest population in Shewa with 21.2% of the total population of the province. It should be noted that these figures were published before the reorganisation of the administrative areas.+ It is, however, still the most densely populated awaraja of Shewa. Haikotch and Butajira has the second highest population with 13.5% of the total population and Jibat and Mecha awaraja is the third with 11.1%. Since Jarra has been merged with the present day Yifat and Timuga the lowest population is that of Selale with 4.3% of the population of Shewa. It is interesting to note that Menagesha, Merhabete, Tegulet and Bulga, and Yerer and Kereyu have 7.0 to 7.9% of population each. As large areas of Tegulet and Bulga and Yerer and Kereyu awarajas lie in the thinly populated Rift Valley their density of population is much lower than Menagesha and Merhabete awarajas.

3. The Sex Ratios and Age Strudture

Appendix 9 gives the population of Shewa by sex and age group. It can be seen that the total male figures are about 109,000 higher than the total female figures. This trend exists in age groups upto 19 and above 45 years of age. In these age groups the ratios of males to females is 101.1 per 100. But in the age groups between 19 and 45 years of age this trend is reversed to 102.1 females to 100 males. The reason that the females outnumber males in age groups between 19 and 45 is that in rural areas people migrate to towns when they are in their youth in search of jobs and other opportunities. This statement is supported by the fact that there is higher female to male ratio between 20 and 34 years of age than older age groups.

From the same table it can be seen that about 43.7% of the population of Shewa are children under 15 years of age.

+ Kambata was part of the Arusi province and once covered the whole of the present southern Shewa.

School aged children (5-14 years of age) alone account for some 26.7% of the entire rural population. Nearly 42.8% of the population fall in the economically active groups of 15-44 years. The normally dependent population (those under 15 years of age and those above 59 years taken together) account for about 48.7% of the total rural population of Shewa.

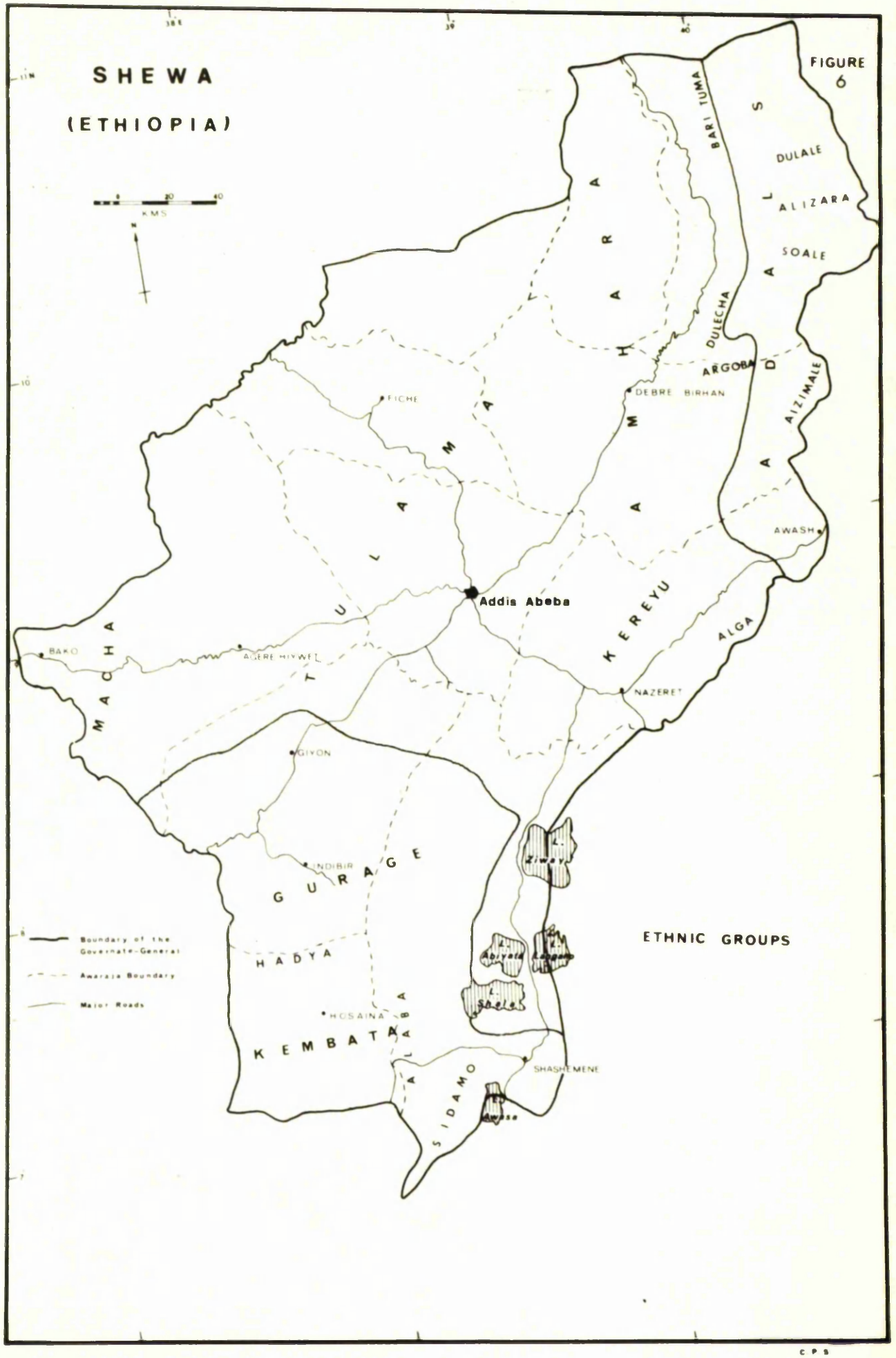
4. ETHNIC GROUPS

Since the land use practices are influenced mainly by the customs and traditions of the various ethnic groups it is important to discuss their distribution. The ensete-eating Gurage and Sidamo, the sedentary Amharas and Gallas, and the nomadic Adals have all contributed in their own way in shaping the Shewan cultural landscape to its present form. Not only in the past but also in the future the customs and traditions of all the ethnic groups will influence, assist or hinder the development of land.

There are four major groups in Shewa: 1. the Amharas 2. the Gallas 3. the Gurage and, 4. the Adals. There has, in fact, been a great mixture of blood among all the groups. None of them is in any way racially pure. Indeed "they have absorbed so much alien blood, partly from each other, partly ..... from sources difficult to identify that the term 'race' has little meaning in this connection."[9]

4.1 The Amharas

The Amharas are ethnically very close to the Semetic Tigre of northern Ethiopia. As one people, with one language (Ge'ez), they established the Aksumite Kingdom, which was later extended southwards into Shewa. The Amharas became predominent in the southern part of the Kingdom with Amharic as their language. Amharic, like Ge'ez and Tigrinya, is a Semetic language but it has been


SHEWA
(ETHIOPIA)
FIGURE 6
KMS
BARI TUMA
DULALE
ALIZARA
SOALE
DULECHA
ARGOBA
AIZIMALE
AWASH
FICHE
DEBRE BIRHAN
Addis Abeba
BAKO
AGERE HIYWET
NAZERET
ALGA
GIYON
NDIBIR
HOSAINA
SHASHEMENE
L. Ziway
L. Abiyata
L. Shala
L. Awasa
MACHA
TULAMA
KEREYU
GURAGE
HADYA
KEMBATA
SIDAMO
Boundary of the Governate-General
Awraja Boundary
Major Roads
ETHNIC GROUPS
CPS

moulded to a great extent by the Cushitic tongues of southern Ethiopia. It is the official language of Ethiopia today with English as the second official language. Unity of the two groups is found in the common legacy of Aksum, the Ethiopic alphabet, Ge'ez literature, Monophysite Christianity, similar political and social institutions, and the same style of life.[10] The Amharas have, however, mixed with the Cushitic Gallas, a reason which makes the Tigres feel that they are of somewhat purer racial stock than the Amharas.

In Shewa the Amharas and Gallas live together over a greater part, the Gallas predominating in central and western parts of the province and the Amharas in the north. In fact, it was northern Shewa, particularly Menz, which was not overrun by the Gallas and which provided the base for the Amharas to reconquer the south. Though they are in minority in numbers the Amharas have been ruling power in Ethiopia through much of medieval and modern times.

Whereas the Amharas have dominated the Ethiopian political life they have also been an agricultural and herding people. The Amharas, together with the Gallas, represent the plough culture in Shewa which distinguishes them from the tree-root eating tribes of southern Shewa. They are also responsible for bringing an increasing amount of land under cultivation and for the destruction and replacement of original woodlands on the Shewan Plateau. They believe that the grains are superior food to green vegetables and root crops which led to the expansion of grain cultivation in the highlands. The Amharas value their cattle highly "not only for the usefulness of oxen for draft purposes and of cow for milk, but for the prestige that possession of cattle gives to the owner."[11] As will be found in the later chapters that it is due to this fact that the rural economic life of the people centres around the

grains and cattle.

4.2 The Gallas

The original home of the Cushitic Gallas is not known. But they are the largest single ethnic group living in Shewa. They are not only found living a sedentary life on the highlands but also in the hot lowlands where they have taken to pastoralism and nomadic life. The Gallas live in a wide belt from west to east in central Shewa. Their intermingling with Amharas has already been discussed under 4.1. Though there is a large number of Amhara people living mixed with the Gallas, it is the Gallas who are predominant over much of the Shewan Plateau. In the lowlands, however, it is mostly Galla stock as the Amharas tend to live on the highland only. The Gallas were originally pastoralists but they started living a sedentary life after coming in contact with the Amharas and now belong to the plough culture.

There are three main tribes of Gallas in Shewa: 1. the Macha, 2. the Tulama and, 3. the Kereyu. The Macha live in the area west of the line running southwards from the mouth of the Muger to Kebenna, north of Gurage. The Tulama extend eastwards from the Macha across Shewa beyond Ankober to the edge of the highlands; on the south, to Lake Ziway and the Awash river; and on the north up to Merhabete.[12] The Galla tribes here are much mingled with Amharas. The Kereyu live to the north and east of Nazret. Up to to Welenchiti they are farmer-pastoralists.but beyond this small town they are replaced by Kereyu pastoralists.[13] These are the first of the nomads to be encountered in the lowlands of the Awash.

Islam is the religion of the majority of the Galla tribes,[14] but many of the plateau people have long accepted Christianity. Throughout the 18th and 19th centuries there were minor wars between

the Gallas and Christian Amharas. The Gallas overran the large part of the Shewan Plateau but the rivers Jama and Chacha formed the natural barriers in their path in subduing the Amhara strongholds of the Menz. It was in the second half of the 19th century that the Gallas were defeated and completely subdued by Emperor Menelik.

4.3 The Gurage

The Gurage are basically of Sidamo stock. They are a mixture of various ethnic groups of Ethiopia but Sidamo strain predominates. Through the centuries the Sidamo and Semitic invaders intermarried to produce the Gurage, whose physical characterstics resemble, in general, those of the Sidamo. The distinguishing feature of the Gurage from other ethnic groups, except the Sidamo, is their food habit. The root of the banana-like plants, called ensete, is their main food. The Gurage represent the hoe culture in Shewa and their social and economic life rests on the cultivation of Ensete edulis, though some grain crops are also cultivated.

The Gurage live in south-west Shewa from Omo valley eastwards to almost up to Lake Shala; in the north they are bounded by the Gall-Amharas and in the south by the Kambata people. The Gurage population has been estimated between 350,000 and 500,000.[16]

Similar to the Gurage the Kambata are also of Sidamo stock. They live in the south-western part of Shewa on the fertile Kambata plateau. But the difference between them and the Gurage lies in the farming tools. The Kambata are practitioners of a highly developed agriculture which includes ploughing with oxen, terracing the fields and fertilisation with animal manure. They raise the same crops as the highland peoples, in addition to the staple ensete. The Kambata were previously Muslims but were converted

17

to orthodox Christianity. However, with the Galla invasion of the sixteenth century many of them reverted to their local religions.

4.4 The Adals

The Adals, or Afars as they call to themselves, are of Semetic origin. They are among the least studied people of Ethiopia. They occupy a large part of the Rift Valley to the north of Awash town. The difficult environment in which they live made them merciless and ferocious people and were dreaded by the highland Amharas and Gallas. These nomadic people are herdsmen owning camels, cattle and goats. They are not still civilised people; pottery and iron tools are unknown to most of them even today. They build dome-shaped huts made of matting spread over bent sticks which can be easily abandoned while moving to another place in search of food and water.

The recent agricultural developments in the Awash Valley is threatening their traditional way of life. With large areas being brought under cultivation by irrigation from the Awash efforts are being made to settle them on some of the farms. They being introduced to and encouraged to adapt a sedentary way of life. The proposed development projects in the Awash Valley are bound to change their attitude and economic life within a matter of decades.

PART TWO: LAND UTILISATION

9. INTRODUCTION

9.1 Review of Published Material on Land Use in Shewa

9.2 Land Use Classification

9.3 Methodology

9. INTRODUCTION

9.1 Review of Published Material on Land Use in Shewa

Very little work has been done on the land use in Shewa. The availabe material deals with this topic very briefly and superficially. Most of it is concentrated on the area to the south of Addis Abeba and in the Awash Valley.

The 'Report on Survey of the Awash River Basin' by the FAO[1] discusses the land use at some length. But it devotes only about five pages to the current land use in the Awash Basin, about half of which lies outside Shewa. Such important land use type as cropland, which constitutes about 70% of the land use types in Shewa, does not get even half a page in the report. On the other hand land with woodland and savanna, which is found in the small section of the Rift Valley, particularly in the northern section, have been discussed at great length. The Report was written for the Awash Basin as a whole and obviously land use in Shewa was not the object of this project. The prospective land use envisaged in the report, however, is of interest and would be referred to in later sections.

The other report which touches land use in two study areas falling mostly in Shewa is 'Systems Analysis Methods For Ethiopian Agriculture' by the Stanford Research Institute of California.[2] The study areas included the region around Debre Zeit, to the south of Addis Abeba, and the area to the north of Awash town, some of which lies in Shewa. Description of land use in this report is also very limited covering only five pages.

Huffnagel in his 'Agriculture in Ethiopia'[3] deals

with land use very superficially in generally referring to Ethiopia as a whole. He does not use any specific land use classification while discussing this subject, to which he allocates no more than two pages in his book.

In addition to this descriptive material some useful statistics about land use are also available. These statistics have been published by the Central Statistical Office, Addis Abeba. Figures given by Eichberger have been based upon the Statistical Abstract 1965 of the Central Statistical Office (See Appendix 10). Though statistics from these sources are important, and they will be used wherever necessary, their reliability is limited as they are mere estimates.

9.2 Land Use Classification

As there are a number of classifications of land use it has been necessary to follow a particular classification. In this way different areas can be compared with the province of Shewa, as well as allowing comparision with studies of other countries.

For this study the land use classification suggested by the Commission on the World Land Use Survey of the International Geographical Union has been adopted. This classification has been applied to a very elaborate study of land use in the neighbouring Sudan by Dr. J. H. G. Lebon.[4] Dr. Lebon modified the classification of the World Land Use Survey according to the local needs, though basically this scheme remained the same as suggested by the IGU. The modification was necessary so that the scheme should be appropriate to this tropical country in an early stage of development. Secondly, it was kept in mind that the adapted classification should conform

to the actual disparities between economies in the country. Thirdly, all types included in the classification should be readily identifiable on the air photographs.[5] The same scheme has been further modified to the needs of Shewa keeping these principles of classification in mind. The various land use types in Shewa and their description follows in the next chapter.

9.3 Methodology

The World Land Use Survey proposed to tackle the land use surveys in two complementary forms: a. maps embodying the survey, and b. explanatory memoirs.

Both of these in Shewan context presented problems, sometimes insurmountable. The largest base maps available for Shewa as whole were on 1:500,000 scale. They were unsuitable for detailed land use maps as some of the details in the maps were wrong. These maps were compiled from the Italian series of maps prepared before the Second World War. Since they were made many changes have taken place in the cultural landscape of Shewa. Many new towns and villages have come up and several new roads have been constructed. The United States Air Force Preliminary Base maps, which are based on the Italian series and modified in some cases by the aerial photographs, are also not very satisfactory. They lack accuracy and are not up to date with the changes. Topographic maps of the province, based upon the photography done by the Mapping Mission of the U.S. government are not expected to be availabe for a decade at least.

During the period of field-work aerial photography of the whole province was incomplete. In many cases the parallel flights for photography were far apart and the photographs did not overlap. As result even an uncontrolled mosaic of the photographs

of the province could not be made for delineating the land use. Besides, the aerial photographs of the Blue Nile basin which covered most of the north-western part of Shewa were with the Water Resources Department, and unfortunately it was not possible to take the photographs of one department to another for making the mosaic. It was only when the field-work was complete that continuous photography covering a few parts of the province were available at the Ethiopian Mapping and Geography Institute. Still one large section that of the Abay basin, was incomplete.

Under the circumstances a land use map of the province could do no better than show the approximate boundaries of different land use types(Figure 7). These boundaries are likely to be slightly changed when better base maps and full coverage of aerial photographs are available. The large scale land use maps were not drawn, but air photographs of different parts of Shewa were annotated and presented with relevant text (for location of Air Photo Studies see Figure 8). Since these photographs present tilt and height distortions they are at an approximate scale only.

For the explanatory memoir (chapter 10), relevant data were not available from any government department and it was found necessary to interview farmers in the countryside. Owing to inaccessibility in most parts of the province it was decided to take the land use samples only along the all-weather roads. There is no doubt that these roads have a direct effect on land use practices and the situation would be different away from the roads. But in the field there was no other choice. The results shown by these samples are of great interest and their usefulness will be shown in the later sections. Since most of the all-weather

roads pass through the cropland area of the Shewan Plateau and the southern section of the Rift all the samples belong to this land use type only. However, effort has been made to give as much information about other land use types as possible. The questionnaire used in the field-work can be found in Appendix 20.

In all 255 farmers were interviewed along the major all-weather roads. Since details like their name, number of their tukuls, whether they were landlords or tenants etc. were not known beforehand it was not possible to select the sample according to a carefully prepared statistical frame. The absence of maps made it impossible to locate farms at random distances along the road, and therefore clustered samples of three to four farmers were enumerated at convenient distances along the major routes (See Figure 7). During the field-work it was found that most of the farmers were suspicious of our motives in asking questions about their lands, crops and cattle, and it is very likely that sometimes such figures were understated. But in reply to questions in which the farmers felt that they had nothing to lose it can be expected that the figures are correct, as is the case of food consumption pattern, diseases among the cattle, sufficiency of grass and water in their area, whether they were practicising soil enrichment and conservation, etc.

Additional material of a less systematic type was assembled through personal observations during travels in different parts of Shewa were recorded regularly. Some air photographs were also taken to the field and checked.

10. LAND UTILISATION

10. LAND UTILISATION (Contd.)

10.4.5.3 Farm Size

10.4.5.4 Ownership/Tenancy

10.4.5.5 Land Utilisation

10.4.5.6 Crops

10.4.5.7 Crop Rotation

10.4.5.8 Soil Conservation And Enrichment Practices

10.4.5.9 Livestock

10.4.5.10 Food Consumption Pattern

10.5 Improved Permanent Pastures (Managed or Enclosed)

10.6 Unimproved Grazing

10.6.1 Used Unimproved Grazing in Highland Vegetation

10.6.2 Used Unimproved Grazing in Woodland Savanna

10.7 Woodlands

10.8 Swamps and Marshes

10.9 Agriculturally Unproductive Land

10. LAND UTILISATION

10.1 Settlements and Associated Non-Agricultural Lands

10.1.1 Rural Settlements

As has been seen in Chapter 8, a vast majority of the population of Shewa lives in the rural areas. The total area of land under the rural settlements is difficult to estimate in the absence of relevant data. The people live mostly in the thatched-roofed 'tukuls', or huts, all over the plateau, sometimes dispersed over the landscape and in other areas making an agglomerated pattern of settlements.

The Amhara-Galla region extending over the undulating central core of the Shewan Plateau, mostly lies within type 4a-6a (Figure 7) and shows a dispersed pattern. There are large cultivated areas between the tukuls of one group of families and another. The tukuls are fenced with eucalyptus material and thorn bush. The distance among the groups of tukuls is not large and in case of need help can be easily summoned from the neighbouring families. Small groves of eucalyptus are grown near or around each group of tukuls, generally 3 to 6 trees in number, belonging to a family. Thus Type 4a-6a presents a spectacular sight of round and thatched-roofed tukuls with eucalyptus groves all over the landscape (Plate 5.2).

But people in all the other agricultural regions tend to live in large settlements. In the Gurage and Kembata areas people live in neatly arranged villages. Settlements are usually found along a line on both sides of the road passing through them (Air Photograph 5). These settlements are established over the

higher part of the undulating land which has been eroded by numerous non-perennial streams. Surrounding each homestead are rows of banana-like plant, ensete, and coffee. Nearer the water courses on the slopes behind the settlements is the land which is generally used for a few grain crops. Ensete, however, is the staple food crop of these people. (For a detailed description of ensete see 10.3.3). The tukuls in the Gurage-Kembata region are mostly fenced with bamboo strips. Most of the wood used for construction of these tukuls is eucalyptus which is grown in most of the settlements for this purpose as well as for firewood. Before the introduction of eucalyptus in the last century the tukuls were made from the wood of 'dat' (Juniperous procera), 'zegba' (Podocarpus gracilior), 'garba' (Syzygium guineese), 'inet' (Arundinaria alpina) etc.[1]

The agglomerated pattern of settlement is also found in Region 4 of the cropland area (See 10.4.5), and in areas of terraced cultivation. The reason of people living close to each other in the former seems to be that they live in predominantly acacia woodlands and bush which give shelter to dangerous animals and provide a good hiding place for an enemy. A family living away from others may become an easy prey of both of these. Besides, it is a comparatively dry region which needs a joint effort of several people to find food through the year. Thus the food and shelter are the main factors which force the people to live together in this region. Similar reasons account for the agglomerated pattern of settlements in the region of terraced farming, i.e. in Menz and Merhabete. Air Photograph 1 shows clearly that the people here live close together, away from the water courses, on a relatively flat land, preferably on an 'amba' which shelters the people from floods and the enemy. The

food can be obtained from farming the land on slopes and in lower valleys. The tukuls on a steep slope also tend to be close to each other. Eualyptus is the main wood for construction in this region also.

In terms of remoteness both the dispersed and agglomerated settlements are similar. Most parts of Shewa become inaccessible even a few kilometres from the all-weather roads in the rainy season. The soils tend to be sticky after the rains and then it is difficult even to walk. In Menz and Merhabete which have largest number of deep rivers the settlements are cut off from even the neighbouring 'ambas' and life in those areas comes to a standstill. Gurage and Kembata areas also experience the same difficulty of communications in the rainy seasons. The small streams turn into torrential rivers and settlements over the higher parts of the plateau are cut off from the neighbouring settlements. In the rainy season, therefore, most of the rural settlements, both scattered and agglomerated, are inaccessable and secluded. This factor obviously affects the economic life of Shewa in this season.

10.1.2 Urban Settlements

The urban areas, on the other hand, are mostly connected with all-weather roads and their economic life is not disrupted by rains. As shown in Chapter 8 Shewa has the highest urban population in Ethiopia. According to the Central Statistical Office, Addis Abeba the 53 towns of Shewa have a total population of 854,917, including 644,190 of Addis Abeba.[2] The population of other Shewan towns varies between 184 and 13,651.

An exact area under all the towns is not known. But an estimate can be reached by taking the average density of Addis

Abeba and dividing the total urban population with it. By such an estimate the total area which should be occupied by the total urban population comes to about 310 square kilometres, of which 218 square kilometres, or 70.32%, is occupied by Addis Abeba alone.

Most of the towns of Shewa are the product of not more than a century of development. Addis Abeba was founded only about 80 years ago in 1887 by Emperor Menelik and has grown at a fantastic rate, a trend which continues even today. Before the founding of Addis Abeba most of the towns in Shewa, which were very few, were mainly feudal settlements within a feudal state. They served as the administrative centres as long as the emperor remained there and did not grow into urban centres. Ankober is one such towns surviving today which has no more than historical importance. It has a small population of 9,234.[3]

A number of factors led to the development of urban centres in Shewa. With the construction of the railway line a string of stations was built along the railroad. Among the station towns which have achieved greater importance today are Dukam, Akaki, Debre Zeit, Mojo, Nazret and Awash. Metahara is developing with establishment of Metahara sugar estate. With the development of the Awash Valley these towns are gradually becoming industrial centres with their hinterlands growing larger. The Italian occupation of Ethiopia from 1936 to 1941 resulted in the founding of several small towns such as Alem Gena, Sebeta, Tafkie, Sulelta and Sendafa. The Italians also promoted urbanisation by encouraging the centralisation of non-farm activities such as moving existing periodic markets to urban centres, giving free land to the new settlers in the towns which provided a break with the traditional land tenure system,

and the reorganisation of the economic activities of the different areas.[4] After the Italian-Ethiopian conflict, in which the Ethiopians succeeded in recapturing their country, the Ethiopian government established a variety of programmes and offices in small towns, including schools, police stations, local administrative offices, judicial offices and technical aid programmes. But the growth rate of such towns was not as high as that of the railway station towns to the south of Addis Abeba.

Thus the urban centres in Shewa did not come into existence with the main function of providing goods and services to their hinterlands. They were the product mainly of political factors and later attracted the people from the surrounding countryside. The pace of urbanisation began to quicken after the Italians left Ethiopia, and with the construction of the planned roads in different parts of Shewa those towns which have a small population today may also follow the same trend as the other major towns.

10.2 Horticulture - Fruits and Vegetables

10.2.1 Introduction

Although the varying altitude, climate and soils make it possible to grow fruits and vegetables in many parts of Shewa the total area under horticulture is very small, and horticultural products are not available in many parts of the province. The 'Dega' climate regions (see page 41) which cover most of the northern part of Shewa to the north of the latitude of Addis Abeba are not suitable for many fruits. As will be shown later a large percentage of the Shewan population does not eat fruits at all. Vegetables are grown on small garden plots near the tukuls mostly for domestic consumption but some are taken to weekly markets to

to be sold for cash.

Besides, fruit gardening is done only in those places which have a constant supply of water for irrigation and which are within a few hours travelling distance by automobiles from Addis Abeba and other major towns. Vegetables for sale in towns are also grown where these facilities are available. This type, i.e., fruit and vegetable gardening, should be considered under Type 3 (Tree and Other Perennial Crops), if the World Land Use Classification were to be followed strictly. But since this type directly affects the food habits of the people living nearby it was found more relevant to discuss it here.

In the samples taken along the major roads of Shewa it was found that only 2.7% of the total farm area was devoted to vegetables and fruits combined (Appendix 10 Table 2). Of this a larger proportion was devoted to vegetable production. The samples did not include any area which is devoted to market gardening. According to the estimate of Eichberger the total area under horticulture in Shewa in 1964 was only 20,000 hectares, which is 1.44% of the total cultivated area. Though these percentages differ the difference is not greater than might be expected from such small samples and the figures confirm that the area under horticulture in Shewa is very small indeed.

10.2.2 Fruits (Type 2a)

In most of the parts of Shewa people get no more than wild fruits such as black-berries, rose-hips, figs etc. In fact fruit does not constitute part of the Ethiopian diet. My samples show that about half of the rural population of Shewa does not eat fruits at all (Appendix 17 Table 31). Most of the fruit grown in

in the province is consumed by the upper class families in the towns. Since Addis Abeba has the largest proportion of such families most of the fruits grown in the countryside find their way to markets in Addis Abeba. Yet all the fruit production in Shewa is small to meet the demand and fruit is flown from different parts of Ethiopia like Asmara, Herer, Jima etc. and from overseas.

Appendix 17 Table 31 shows that among the rural population a very small percentage eats fruits daily or once or twice a week. It is in the comparatively lowland regions (Regions 3 and 4 in Figure 7) that fruits are eaten more. This is because there is a more favourable climate with temperatures around 21°C for the production of tropical fruits. Thus most of the tropical and sub-tropical fruits are grown in the southern half of Shewa.

But even in the southern part of the province the proportion of the fruit eating population in the countryside is very small. Since the samples were taken along the roads leading to Addis Abeba and on which other major towns are located the fruits grown on the sample farms were mainly for the urban demand and it can be expected that the amount of fruits eaten by the rural population away from the roads is still smaller. The absence of a ready market for the fruits grown in areas away from the roads deters farmers from cultivating fruits.

Even if the higher percentage of fruit eating population along the major roads is accepted for the people living in the countryside of Shewa the total number of people who are lucky enough to get fruits to eat even upto once a month is approximately 779,000 out of the total rural population of 3,115,400. Thus the peasant cultivation of fruits does not exist in Shewa.

In brief the market for fruits being restricted to larger towns only, fruit gardening is done along the major roads, generally to the south of Addis Abeba and particularly along the Addis Abeba-Nazret road where several large and small plots are devoted to fruit production. Besides, Sebeta fruit farm on the Addis Abeba-Jima road and Mulu farm a little away to the west from Addis Abeba-Fiche road, are other prominent fruit gardening centres. Availability of water for irrigation has made it possible to grow tropical fruit such as bananas and papayas (pawpaws) in these and other recently cleared commercial farms in the Awash Valley. Fruit is transported by lorries and railway to most of the major station towns of Shewa and also exported to Herer and Dire Dawa. The production of fruit is growing larger in the Awash Valley which has helped to reduce the imports of fruit from overseas. Similar conditions are available in the Robi farm area where mangoes are grown along with bananas and papayas.

On the uplands where subtropical temperatures permit oranges, lemons, limes, tangerines and grape fruits are grown in several parts of Shewa. Guder, Akaki, Debre Zeit, Mojo and Nazret are the major centres for such fruits.

10.2.3 Vegetables (Type 2b)

Appendix 17 Table 30 shows that about two thirds of the rural population eats vegetables at sometime or other. Some vegetables form an essential part of the diet, however, in some areas, particularly in Region 4 (Figure 7) which is a drier area, the proportion of people never eating vegetables is highest. But it should also be noted that it is also has a high percentage of population which eats vegetables daily. It is because there are

many towns of considerable size in this region. There is a great demand for vegetables in these towns which stimulates production. This explains the existence of areas of specialised irrigated vegetables watered by the Awash river in this region. From the same table it emerges that the percentage of people who eat vegetables daily or once or twice a week is highest in Region 3 (Figure 7) which constitutes mostly the Gurage-Kembata region. Most of the people in this region grow vegetables on small plots around their tukuls. In northern Shewa, in Regions 1 and 2 (Figure 7), the climate is too cold for many vegetables and about a third of the population does not get vegetables at all. The percentage of vegetable eating population is, therefore, smaller than southern Shewa.

Vegetables are grown, therefore, almost everywhere on the Shewan Plateau. They are grown on small garden plots around the tukuls and along the streams. Amharic cabbage, potatoes, squash and guards are the vegetables grown by the peasants for domestic consumption. On the whole, the proportion of farms under vegetables is very small, and only slightly more than the area under fruit. (See Appendix 10 Table 2).

On commercial farms beets, cabbage, carrots, cauliflower, cucumber, eggplant etc. are grown along with potatoes and tomatoes. These vegetables are grown entirely for urban consumption and are not known to the ordinary people in the countryside.

10.3 Tree and Other Perennial Crops

In this category are included all such crops which remain standing almost throughout the year. They include plantations of coffee, sugarcane and sisal. Though the area under them is small

and they are not grown in every part of the province they are of great economic and industrial significance. Since they all need a constant supply of water, except sisal, they are grown in those areas where either the rainfall is sufficient or water supply for irrigation is available throughout the year.

10.3.1 Coffee (Type 3a)

Ethiopia is considered to be the original home of coffee. It is believed that coffee grew wild in south-west Ethiopia, particularly in Kefa province from which coffee has derived its name. Probably in the thirteenth or the fourteenth century the Arabs introduced Ethiopian coffee into Yemen and later it was called as 'Coffee arabica'. Even today coffee grows wild in some parts of south-west Ethiopia. Kefa is the adjoining province to south-western Shewa and it is in this part of Shewa that coffee is grown.

In Shewa, coffee grows predominantly in the Gurage-Kembata region (Figure 16) for mainly two reasons. First it is this part of the province which has favourable conditions for the growth of coffee. The rainfall (over 1,100 mm.) is generally higher than other parts of Shewa and it is suitable for coffee. To the west risk of dry periods increases. Also the volcanic soils of the undulating Gurage-Kembata plateau provide a range of altitude of about 1,600 metres, giving gentle well drained slopes necessary for coffee. Secondly, a beverage like coffee has become an essential part of the diet of the people. It gives them the opportunity to rest and sometimes serves as the stimulant.

Coffee is grown over most of the Gurage-Kembata plateau. It is grown along with ensete near most of the tukuls. Samples taken in this region show that about 41% of the total farms

of this region grow coffee (Appendix 17 Table 12). The samples also show that in other regions of Shewa coffee is not grown at all.

Since coffee is grown on tiny plots the total area under coffee is very small. There are no large commercial plantations of coffee as there are in many other parts of Ethiopia. Most of the coffee produced in this region is consumed in the families who grow it. The total production of coffee in this region is less than local demand and some coffee is imported for the large urban centres and for the regions without coffee from other coffee producing provinces of the country. Despite the insufficient production of coffee in Shewa it is a beverage popular not only in south-western Shewa where it is grown but also in almost every part of the province, irrespective of altitude, climate and degree of development.

10.3.2 Sisal (Type 3b)

Sisal is grown mainly on two small plantations in Shewa. One is near Mojo, 65 kilometres from Addis Abeba on Nazret road, on both sides of the road along the left bank of Mojo river on an altitude of about 1,800 metres. The other is on the Sheshemene-Awasa road on the government experimental farm of the Ministry of Community Development. It lies just on the Shewa-Sidamo boundary between the road and Mt. Chubi. It is a much larger plantation than Mojo. Sisal is grown temporarily on this plantation and may be cleared as soon as the plans of the government change in this regard.

Sisal is grown on these plantations for cheap quality fibre. The land remains under sisal for several years and cutting is done only once a year. The fibre is obtained by feeding sisal leaves into a corona-type decorticator which has been installed near Awasa town on the other part of the experimental farm which lies

entirely in Sidamo province.

10.3.3 Ensete (Type 3c)

Ensete is grown for food in the Gurage-Kembata region along with a few grain crops. Each family has its own small plantation of ensete grown around its tukuls. It has been discussed in detail under cropland (See 10.4.4.2)

10.3.4 Sugar cane (Type 3d)

The peasant cultivation of sugar cane is insignificant in Shewa. Until about 16 years ago local cane for chewing was grown in very small stands near some of the tukuls. Though imported sugar was used in variety of ways no sugar was made from the sugar cane produced in the province. The reasons for the lack of sugar cane production on large scale were the temperatures were too low on the highlands and water for irrigation was not available in the lowlands.

With the development of Wenji sugar estate to the south of Nazret tremendous changes have taken place in the production of sugar cane and the country has a flourishing sugar industry. On 12th June 1951, an agreement was signed between the Ethiopian government and the Dutch firm H.V,A. for a concession of 5,000 hectares and for the building of a sugar factory with a capicity of 8,000 tons of sugar per year.[5] Soon the land was cleared for the sugar cane plantation and a sugar factory was constructed on the site. In 1954 the first sugar from this factory came on the market. Another factory to increase sugar production was constructed in 1962 and the area under sugar cane extended which has now reached to 6,843 hectares.

The Wenji sugar estate is now meeting not only the demand for sugar in Ethiopia but also has some surplus for export.

The total import of sugar in 1954 at the time Wenji sugar factory started working was 20,947 tons. By 1963, Ethiopia's domestic requirements were fulfilled and a surplus of 7,500 tons of sugar was made available for export to foreign markets.[6] In 1967, this surplus, however, was reduced to 6,036 tons.[7]

To meet the future demand and also to make some sugar available for export work has started on a nearly £2.3 million Metahara sugar estate project to the south of Metahara railway station. This sugar plantation will be about 11,000 hectares in area, of which more than 300 hectares was cleared of bush in 1968. The project has been undertaken by H.V.A.-Metahara, a share company with about half of the shares belonging to the company which established the Wenji sugar estate.

Such a rapid development in enlarging the area under sugar cane and sugar production in less than two decades became possible because of the supply of water for irrigation from the Awash river. Besides, the Wenji sugar estate is situated at about 1,500 metres above sea level and the temperatures (around 20°C) are just suitable for rather slow growing and maturing cane. The maximum day temperature reaches to about 30-31°C from March until June, and during rainy season, from July to August, it does not normally exceed 26°C. Rainfall is only 750 mm. per year. The soils are heavy clay of volcanic origin which have been formed by the annual inundation of Wenji plain in the rainy season.

But Metahara is located on a much lower altitude at about 964 metres above sea level. Climatological records for this place cover only 1966 and 1967 and show that temperatures are higher than the Wenji sugar estate. For about ten months from February to October the mean maximum temperature is always higher

than 30°C and from November to January it is around 29°C. The rainfall is slightly lower than Wenji. The land will be irrigated from the water of Awash river. In due course Metahara will become the largest producer of sugar cane and sugar in Ethiopia. Work on the construction of a sugar mill is underway.

10.4 Cropland

10.4.1 Introduction

Except in the lowlands of the Awash Valley to the east of the escarpment of the Shewan Plateau peasant subsistence cultivation is done almost everywhere in Shewa. This is the largest single land use type and covers more than three fourths of the province (78.27%, see Appendix 10 Table 1). The entire rural population, and also a high proportion of the urban population, finds its livelihood from the land in the province directly or indirectly. In other words, the 78% rural population of Shewa (Appendix 8) is directly dependent upon 66,643 square kilometres of land (Appendix 10 Table 1), giving them 2.13 hectares of land per resident. The sole economic activity of Shewa, ignoring Addis Abeba and other major towns, is crop cultivation, whether it be the long standing crops such as ensete and coffee in the hoe culture region of Gurage-Kembata plateau or only grain crops in the plough culture region of the rest of highland Shewa.

Along with cultivation of crops land is left for grazing either near the cultivated fields or near the tukuls. During the period when the cultivated land is left fallow the cattle are allowed to graze on such land. Both types of land use, i.e., cultivation of crop rotation and grazing, are inseparable on most farms. The farmer generally has his own cattle, some for cultivation purposes

and others for milk, meat and sale. The cattle also give him a social standing and financial security. Therefore, the two land use types could not be mapped and discussed separately and they have been combined together, thus modifying the scheme of the World Land Use Survey. Crop rotation with used unimproved grazing together have been called 4a-6a (Figure 7). To distinguish the special characterstics of a particular region further modification to the classification has been made by adding its land use type to the predominant type. For example, the ensete producing region, which also has crop rotation with used unimproved grazing, has been shown as 4a-6a (3c) (See Figure 7).

Thus the following sub-type of Type 4 (Cropland) have been distinguished in Shewa:-

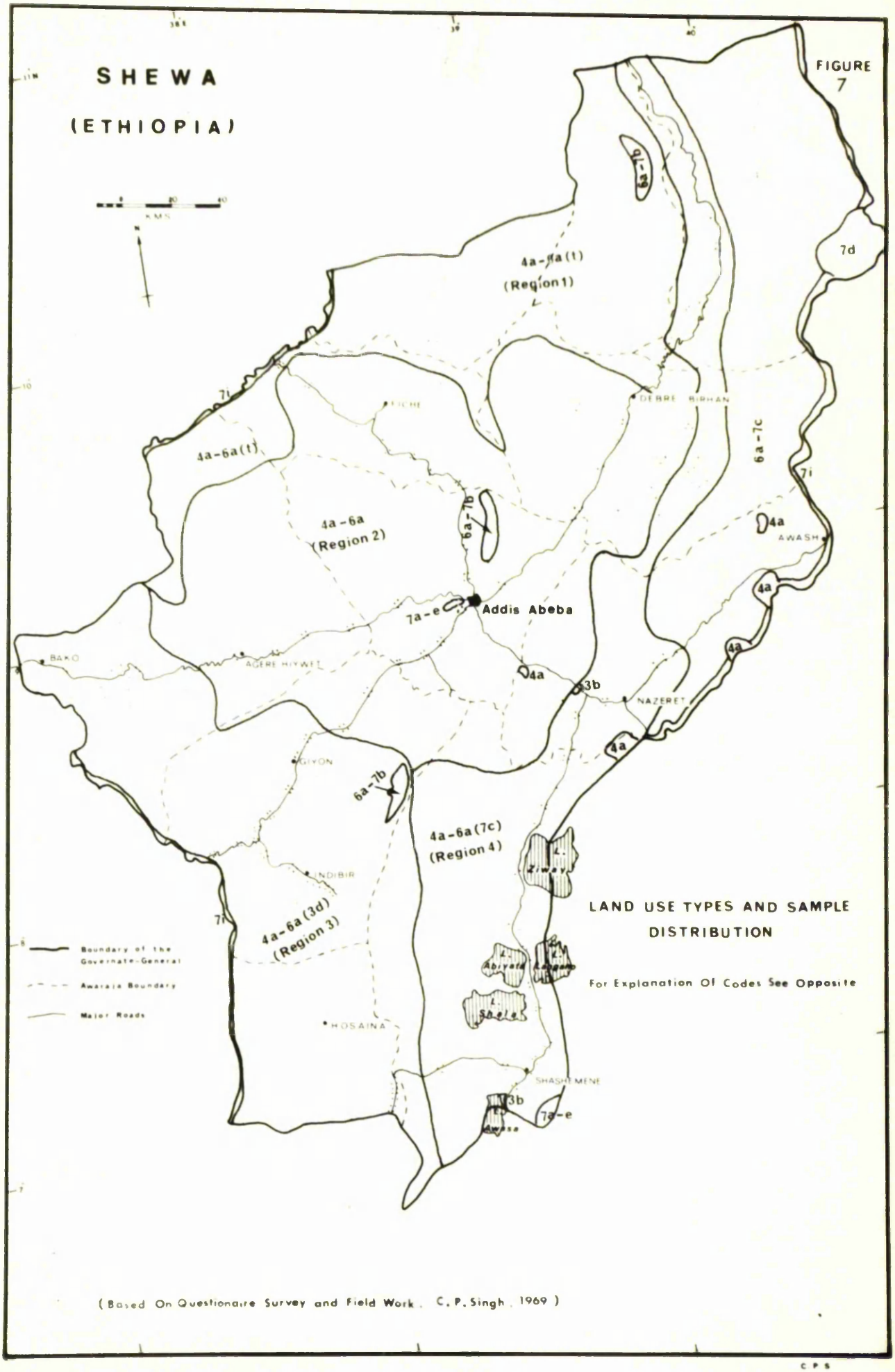
4a'	Perennially Irrigated Cropland
4a-6a (t)	Crop Rotation On Terraced Land With Used Unimproved Grazing (Region 1)
4a-6a	Crop Rotation With Used Unimproved Grazing (Region 2)
4a-6a (3c)	Crop Rotation and Ensete Plantations With Used Unimproved Grazing (Region 3)
4a-6a (7c)	Crop Rotation With Used Unimproved Grazing In Woodland Savanna (Region 4)

(See Appendix 10 Table 2 for area under each of these land use types and Figure 7)

Except Type 4' (Perennially Irrigated Cropland), all the land use types have special characterstics. Each has a distinctiveness and stands in contrast with neighbouring areas. Type 4' only denotes irrigated agriculture and may be found in several regions.

Figure 7 Codes

3b	Sisal Plantations
4a	Perennially Irrigated Cropland
4a-6a (t)	Crop Rotation On Terraced Land With Used Unimproved Grazing
4a-6a	Crop Rotation With Used Unimproved Grazing
4a-6a (3c)	Crop Rotation and Ensete Plantations With Used Unimproved Grazing
4a-6a (7c)	Crop Rotation With Used Unimproved Grazing In Woodland Savanna
6a-7b	Used Unimproved Grazing In Highland Vegetation
6a-7c	Used Unimproved Grazing In Woodland Savanna
7a-e	Dense Evergreen Woodlands
7d	Swamp Forests
7i	Riparian Vegetation


SHEWA
(ETHIOPIA)
FIGURE 7
KMS
4a-6a(1)
(Region 1)
4a-6a
(Region 2)
4a-6a(7c)
(Region 4)
4a-6a(3d)
(Region 3)
6a-7b
6a-7c
7d
7i
7a-e
4a
3b
Addis Abeba
DEBRE BIRHAN
AWASH
NAZERET
AGERE HIYWET
BAKO
GIYON
INDIBIR
HOSAINA
SHASHAMENE
L. Awasa
Boundary of the Governate-General
Awaraja Boundary
Major Roads
LAND USE TYPES AND SAMPLE DISTRIBUTION
For Explanation Of Codes See Opposite
(Based On Questionaire Survey and Field Work, C. P. Singh, 1969)
CPS

There are four major cropland regions in Shewa as outlined above. The core of the Galla-Amhara highlands around Addis Abeba is distincet in relief, farming and cultural practices from the Gurage-Kembata region; the deeply eroded plateau of Menz and Merhabete in the north contrasts with the rather undulating, lower plateauland, predominantly Galla occupied, in south-east Shewa (Figure 7). Each of these regions has its own particular characterstics. Unfortunately the administrative boundaries do not follow the boundaries of these regions, though very often they follow some physical feature such as a river (Figure 8). It was found more logical to ignore the administrative boundaries in the discussion of land use and farming in Shewa. However, wherever possible the administrative sub-divisions, called awrajas, have been taken into account.

10.4.2 Region 1 - Type 4a-6a (t) Crop Rotation On Terraced Land With Used Unimproved Grazing

10.4.2.1 Introduction

This Type covers predominantly the catchment area of the Abay river covering almost entirely Menz and Gishe and Merhabete awrajas and those parts of Selale and Jibat & Mecha awrajas which have been highly eroded by the Guder and Muger rivers (Figure 7). Besides, this land use type is also found on the escarpment of the Shewan Plateau in a thin strip from north to south. Region 1 covers about 12,652 square kilometres, or nearly 19%, of the

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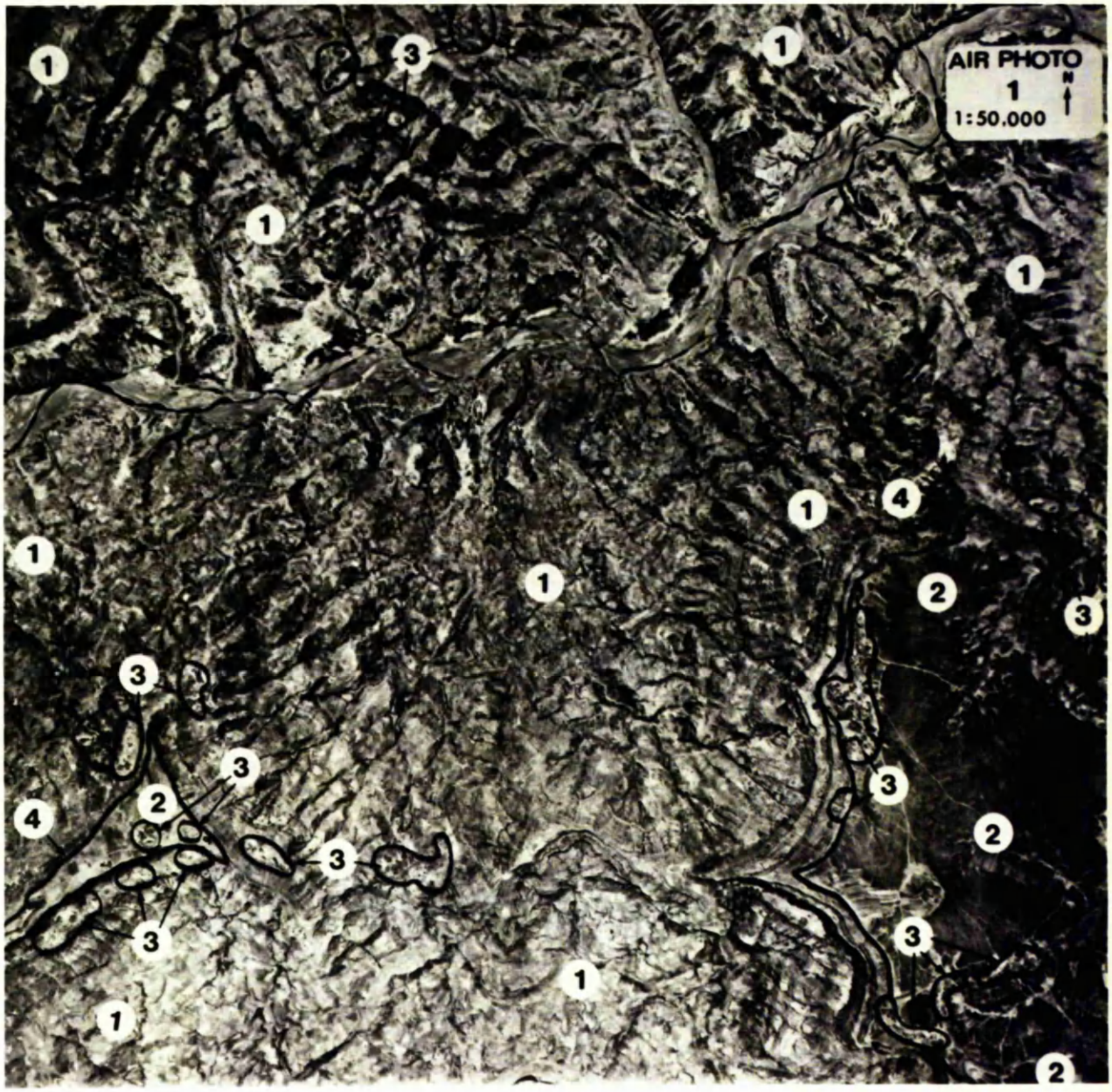
+ For those awrajas which have a combined name, such as Menz & Gishe, Yerer & Kereyu, etc. the sign ' & ' has been used to avoid confusion with the conjunction 'and'.

total cropland area of Shewa (Appendix 10 Table 2) with such important tributaries of the Abay flowing through it as Jema, Wachit, Guder and Muger (Figure 4).

The Shewan Plateau in this region has been severely eroded and the rivers have made deep gorges leaving flat-topped, steep-sided remnants of the plateau, called 'ambas'. The ambas are highly favoured for settlements for they provide the flat land for cultivation as well as security against an enemy. (See Air Photograph 1 on page 111). The ambas have played an important role in the Ethiopian history as they were self-contained fortresses which were invulnerable from an attack from below. By their sheer steepness, and being surrounded by deep river gorges, they are inaccessible even today. It is mainly through this that there are only four samples from the two awrajas of Menz & Gishe and Merhabete. These samples are the result of interviews of a few students, who owned land at their home, and who were interviewed at Debre Birhan. In all 11 samples belong to this land use type, 6 of which were taken along the two all-weather roads passing through this region.

The Region lies between 1,250 and 3,500 metres above sea level. The tilt of the plateau to the west has given rise to higher elevations in the east where it rises to beyond 3,500 metres in the Abuye Meda Mountains. The lowlands of the Abay river and its tributaries form the lowest parts of the region. Even in these low areas the ambas stand out as islands of considerable height above the surrounding eroded lowland. All around in this region lie deep river gorges and high ambas alternatively, making it inaccessible until considerable investment in roads takes place in the future. The few travellers who have written accounts of this



INDEX

1 Terraced and Semi-Terraced Farming
2 Cultivation on the Amba
3 Rural Dwellings
4 Edge of the Amba

region are almost obsessed with the numerous valleys and small flat plateau-lands. The ascent from the bottom of gorges to the next amba is always difficult. One traveller noted that there are sometimes as many as three "chasms that split the plateau" in fifteen miles.[8]

Such a variation of altitude from place to place gives rise to great variations in temperature within a few miles. No climatic records of the area are available to establish this point. But an indication of approximate temperature can be obtained from Dervla Murphy's travel on mule back through this region. She remarks that the plateau tops were generally so cold that "despite my exertions I quickly became so numb that my stiff fingers could not open the buttons of my shirt-pocket".[9] Describing about the change in temperature as the altitude decreases she writes, "During the ..... descent it got hotter every moment and on the floor of the gorge the temperature must have been about 90°F".[10]

It is in this setting that the people of the region are engaged in subsistence crop farming. Generally steep slopes, often cliff-sided ambas, varying temperatures from valleys to amba tops provide man with possibility of cultivating a variety of crops. Though the limited number of land use samples taken in this region may seem insufficient for arriving at sound conclusions they are valuable and of great interest. These conclusions have also been discussed with persons who had the opportunity of travelling through this region. Besides, at the present they are the only means which can help analyse the distinctness of land use in this region.

10.4.2.2 Farm Type

Appendix 17 Table 1 shows clearly that the farms are generally located on the higher elevations in this region. Of

the total, 63.64% are upland farms, while only 36.36% are lowland farms, whereas nearly 75% of the total area of cropland in Shewa would be described as highland, that is above 1,500 metres.

Regions 2 and 3, which cover a greater part of the Shewan Plateau, have a higher percentage of upland farms than this region. The reason for such a high percentage of upland farms in those regions is that unlike Region 1 they are not deeply eroded. But in Region 1 the continuity of altitude is broken frequently by the river valleys (See Air Photo 1).

Even though people like to live at higher altitudes, fearing the floods and malaria of the lowlands, land is cultivated in uplands and lowlands alike. Air Photo 1 illustrates a typical part of the region and it can be seen that land is cultivated almost up to the river beds.

Terraced cultivation is carried out on steeper slopes over most of the region, and the extent of terracing is shown by figures for terracing (Appendix 17 Table 14). They show that almost all upland farms, of which samples were taken, practise terracing. On the other hand, in the lowlands, even though slopes may be steep, the fields are not terraced. This may be because some farmers can not find enough money and labour for terracing, but there are also farmers who do not know the value of terracing.[11]

10.4.2.3 Farm Size

Region 1 has the highest number of farmers with small holdings in all the regions. The figures show that more than 54% of the holding in the region are less than 0.50 gasha (20 hectares) in size (Appendix 16 Table 2). Several holdings included in this

range are as small as 0.05 gasha (2 hectares) and there are a few which are larger than 0.25 gasha (10 hectares) in area. These are the poorest people of the region since they have to find their living from such small farms.

Farmers with holdings of 0.50 gasha (20 hectares) to 2.25 gasha (90 hectares) are about a third (36.36%) of the total. They are better off than the majority of farmers as they have about 3 to 15 hectares of land per resident. There are also a few farmers, about 9%, who have as large holdings of more than 4.00 gasha (160 hectares) giving them more than 27 hectares of land per resident as an average. This category includes the big landowners including local administrators and people connected with the royal family.

10.4.2.4 Ownership/Tenancy

From Appendix 17 Table 22 it will be seen that about 27% of the farmers in this region are tenant farmers ('chisegna') sharing output of the land with the owner on terms agreed by both parties. Though this number of tenant farmers appears to be quite high it is the second lowest in all the four regions.

The rest of the farmers are land owners in one way or the other. About 36% of them are 'gebbar', owners of land paying taxes directly to the government. They can sell, lease or mortgage their land and their rights in land are inheritable. There are also about 9% of the farmers who have been given the land by the state as rewards for their services ('riste gult'). The 'rist gult' rights in land are also inheritable. Besides, there is a small percentage of farmers who own land on other systems, such as 'mederia', land granted to a person instead of salary or pension. Such a land could be withdrawn by the state any time and transferred to another person.

But this form of tenure has been abolished now.

Thus except the tenant farmers, who are more than one fourth of all the farmers in the region, most of the farmers own land and pay taxes directly to the government.

10.4.2.5 Land Utilisation

Land utilisation figures for this region show that more than 56% of the total area of the farms is under cultivation. This is a rather small percentage in a region which has a varied climate suitable for tropical and sub-tropical crops. The reason for this may be that steep slopes in this region make it difficult to cultivate most of the area. Therefore a person often does not cultivate all the land he owns or on which he is a tenant. Besides, the rain has washed the top soil away in many areas making the land unsuitable for further cultivation. Also being an inaccessible region people may not have the incentive to grow crops for even the local market. People have to walk long distances to reach these markets taking them a greater part of the day. These conditions have made people accustomed to cultivate for bare subsistence only.

Therefore, considerable areas are left uncultivated which serves as grazing land. The figures (Appendix 11) show that nearly 23% of the total area is devoted to grasslands. This is the second highest area under grasslands in all the four regions of Type 4. Cattle are grazed on steep slopes as well as on the cultivated land which is left fallow after each harvest. Those river valleys where the slope is too steep for even terraced cultivation are under grassland. As would be seen from Air Photo 1 the sides of some ambas are too steep for grazing and they are dangerous for the cattle.

Very small areas are devoted to the woodlands which

are to be found mostly on the slopes. The area under woodlands is only about 8% of the total farm area. But this is the highest percentage of area under woodlands in all the regions. The reason for such a comparatively high percentage under woodlands in Region 1 is, as already indicated, because the region has much steeply sloping ground. Figures for afforestation (Appendix 17 Table 17) show that the main reason more than 45% of the people plant trees on slopes is to prevent soil erosion resulting in the region having comparatively large area under woodlands, though it is only a very small percentage of the total farm area (8%). These woodlands provide the farming community with their requirements of wood for house construction, fuel and fire, etc.

Vegetables and fruits, as has been discussed under Type 2 (page 100), are grown over very small plots of land, mostly around the tukuls. Only about 7% of the area is under horticulture in this region. The vegetables are grown mostly for home consumption, but some are sold in the market for cash.

It is interesting to note that despite so many rivers in this region only about 3% of the total farm area is irrigated (Appendix 16 Table 8 and Appendix 11). The reason for such a small percentage of area under irrigation is that most of the rivers are non-perennial. In rainy season they are flooded and there is no system to store the water for the dry season. In the dry season when the water is most required these rivers are almost dry. But some farmers construct dams of stones which are swept away in every rainy season. From such small dams water is brought through minor channels to the fields. But there are few farmers who irrigate their land. Almost all farmers are entirely dependent upon the rains,

which are not very reliable.

10.4.2.6 Crops

Owing to variations in altitude and climate from place to place agreat variety of crops are grown in this region. On the higher altitudes of the ambas such crops as barley, teff+ and beans are grown, while on the intermediate altitudes and in river valleys just below the cliffs of the ambas wheat and teff are grown. Teff is the staple food crop and is sometimes grown mixed with wheat, and sometimes barley, at several places.

The figures of the crops show that barley, beans and teff are the most widely grown crops of this region (Appendix 17 Table 4, 7 and 9). Teff is the main food crop, while barley is grown for making 'tella', the local beer, and it is also eaten in roasted form. Beans are used for making 'wot' sauce used with 'injera', the local bread. Since all of these crops do not normally grow below 1,700 metres they are grown on the upland farms between 1,700 and 2,500 metres. The correlation of the altitude and the occurence of these crops can be seen from the tabulations of upland farms and crops. They show that there are 63.64% of upland farms in this region and the percentage of the farms on which barley, beans and teff are grown are also 63.64%.

Wheat is grown at slightly lower, intermediate altitudes of 1,500 to 2,500 metres. In this region it is grown on the lower parts of upland farms and the higher parts of the river valleys. The demand of wheat is not great in this region and it is difficult to transport it to the areas of demand. Consequently,

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+ Teff (Eragrostis abyssinica) is the most important food crop in Ethiopia. It is used by the Ethiopians for making their local bread, the 'injera'.

comparatively few farms grow wheat in the region. The figures of wheat production show that there are only 45.45% of farms which grow wheat in Region 1 (Appendix 17 Table 5). Peas are also grown on almost similar altitudes, quite often in poor and badly eroded soils. Peas are grown on about 55% of farms.

In the hot lowlands, particularly in the lowlands of the Abay gorge, sorghum is grown on about 36% of farms. Maize and chick peas are also grown in the lowlands. But the people generally do not like to grow them as is seen from their figures in Appendix 17 Tables 6 and 10. It is about 18% of the farms which grow maize, while only 9% grow chick peas.

Coffee and ensete are not grown at all in this region.

10.4.2.7 Crop Rotation

Crop rotation is practised all over the region in lowlands and uplands alike. On the higher altitudes, in black soils, generally two crops are taken in a year and they are rotated in such a way that the land does not loose its fertility. However, on several farms in the uplands, and also in the lowlands, the land is left fallow for about six months. Cattle graze on such land freely, frequently contributing to soil erosion. There are a few farms on which land is left fallow for about a year and the same crop repeated again depending upon the size of the holding of a particular farmer. If the area is small the farmer would have to grow food crops on the same field every year and little land would be left fallow for long. But farmers with larger holdings are in a position to leave some parts of their land fallow.

The common rotation in this region, as told by the farmers, is as follows: 1. On the highland - barley and wheat may

be followed by leguminous crops like beans and lentils, which again may be followed by barley, or wheat or teff. 2. In the lowlands - maize fields may be left fallow again. Rotation in both uplands and lowlands continues like this year after year.

10.4.2.8 Soil Conservation and Enrichment Practices

Soil erosion is evident in Region 1 in the form off gorges and deep river valleys carved in the high plateau, the remnants of which are the high ambas. The actual amount of silt added to the Blue Nile floods of Sudan and Egypt from this region is not known. But some of the strongest tributaries of the Abay originate in the region and pass through for long distances. The Jema, Wachit, Muger, Guder etc. flow for about 150 kilometres each before falling into the Abay which itself flows for nearly 100 kilometres on the north-western boundary of Region 1 (Appendix 1). The general altitude of the ambas show that most of the plateau in this region would have been about 3,000 metres high if the rivers had not been active to this extent. Today some of the rivers have reached as low as 1,250 metres.

A few soil conservation practices which are known to the people of this region show that they are aware of the growing menace to their land by the rivers and their tributaries. Some of these practices are terracing the land, contour ploughing and afforestation. Figures of terracing show that 63% of the farms are terraced to some extent and contour ploughing is done on all of them (Appendix 17 Tables 14 and 16). Planting of trees mainly to prevent soil erosion is done on about 45% of farms. All of these practices are done mainly on the upland farms. In the lowlands, on the other hand, it appears that nothing is done to prevent soil erosion.

Figures for the use of manure and grass burning show that about three fourths of the farmers use manure and about a third use grass burning as a means of soil enrichment (Appendix 17 Tables 20 and 21). Manuring is done on both upland and lowland farms and it is the widely known practice among the farmers. The figures show that about 9% of the farmers use fertilisers. My observations indicate that fertilisers are not used at all in this region and therefore the figures do not seem to be correct. This might be because the farmers know only one Amharic word for manures and fertilisers, 'fig'. These figures together, therefore, refer to the people who use manures (See Appendix 17 Table 19).

10.4.2.9 Livestock

Cattle (including cows and oxen) are kept for milk, meat, ploughing, wool and skins etc. and they are some of the most valuable possessions of the farmers. Cows and oxen are important to them for farming, for milk and meat, while sheep are reared for their wool and meat. Menz is the most famous area for wool and the woolen cloaks made there. Most of the supply of wool of Debre Birhan wool factory comes from Menz. In the lowland parts of the region goats are kept.

The quality of the livestock is poor. They are generally tended by the young boys of the family. Their responsibility in looking after the cattle is great as a "boy will be whipped if an animal in his charge gets hurt or lost, or if it gets into fields of grain".[12] However, their work is light and they enjoy being shepherds.

The number of cattle in this region is not known. But figures calculated from the replies of the farmers show that

there are .66 sheep, .68 goats, 1.08 cows, .40 oxen and .77 chicken per resident in this region (Appendix 15). The number of sheep per resident is highest of all the regions. It should be noted, however, that while the number of cows per head is 1.08 the number of oxen is as low as .40 per head. From the questionnaires it was found that there are several families, consisting of 4-5 persons each, which have only one ox on their farms. For such people obtaining the other ox necessary for ploughing the fields is an ever-present problem. It was also found that there are very few farmers who have more than two oxen. But there are several families which have comparatively large number of cows, sometimes as many as 10.

Being a mountainous area the supply of drinking water is satisfactory in the region. Appendix 17 Table 25 shows that more than 81% of the farms have sufficient supply of water for their cattle. It should be noted that this is the only region which has adequate supplies of water for the cattle.

But the region is not so fortunate in the supply of grass. There are only about 27% of the total farms which have sufficient grass. The scarcity of grass in a region which has the second highest area under grasslands arises from two causes. First, a larger part of the region is highland with montane savanna type of vegetation which consists of tiny grasses only. During the dry seasons this grass dries up. Second, some of the grasslands are too steep for grazing. Cattle are grazed, therefore, only on the fallow land on the ambas and in nearby valleys.

There are several diseases prevalent among the cattle. The most common are liverfluke, ringworm and anthrax, along with other diseases. Though about 63% of the farmers reported that their cattle

were innoculated at least once (Appendix 17 Table 27) these diseases continue to remain and the cattle need repeated checks and medical care.

10.4.2.10 Food Consumption Pattern

The food consumption pattern shows two important facts about the economy of a region. First, it reflects the agricultural products of that region. The diet of the people would consist predominantly of those products which are grown in that region. This would also show whether the region is sufficiently meeting the demand for food. Second, it would show the availability of nutrients in the food of the people of that region and the condition of their health.

The figures of food consumption in Region 1 (Appendix 17 Tables 28-36) show that being a grain producing region all the people eat cereals every day. Teff and wheat are the main food crops, while barley and beans provide them with other necessary things like 'tella', the local beer, and sauce to go with 'injera', the bread made from teff. It must be noted that this is the only region where the entire population eats cereals everyday. Ensete, the main food of Gurage-Kembata region (Region 3), is never eaten in this region. It is because this region is predominantly Amhara, a people who despise the eating the root crops like ensete.

Some items of food such as meat, vegetables, fruits, milk and milk products, eggs and fish etc. are not available in sufficient quantities. The questionnaires revealed that meat is eaten rarely by the majority of people (54.55%). However, there are about 27% of the people who get meat to eat once or twice a week. But there is a small percentage of people (9%) who never

eat meat. This is not because of any prejudice against eating meat, as is in many parts of the world. It is mainly because these people do not have either sufficient cattle for meat or are too poor to buy it in the market. It should be noted that there is no one in Region 1 who eats meat every day, though there is a small percentage of such people in other regions.

The vegetable consumption table shows that there are two categories of people in Region 1. First, those who eat vegetables either daily or once or twice a week. They number about 36% of the total.. The second category consists of those who either eat it rarely or do not eat it at all. The percentage of the latter is as much as the people who eat vegetables daily or once or twice a week. On the whole this region has the highest percentage of people who eat vegetables rarely or never.

Nearly half of the people do not eat fruits at all. Those who are fortunate enough to get fruits once or twice a week number only 18%. The rest of the people eat fruits only once in a while, probably when they go to the rural markets.

Figures of milk and milk products consumption show that there are only about 9% of the people who drink milk every day. A little more than a third (36.36%) of people have milk and milk products once or twice a week. The number of those who never get milk to drink and other milk products is the largest not only in this region but in all the regions of Shewan Plateau. This is despite the fact that there are about 1.08 cows per head in this region. But most of the cows belong to only a few families while there are also some farmers who do not have even one cow.

Eggs are eaten by a large majority at least once

in a while. There are only about 9% who do not eat eggs at all. Those who eat eggs daily or once or twice a week number about 27%. About 55% of the people eat eggs rarely.

Fish is eaten very rarely or not eaten at all. Those who eat fish once or twice a week are only about 9% in this region. It may be because the rivers are small and nearly empty for most of the part of the year.

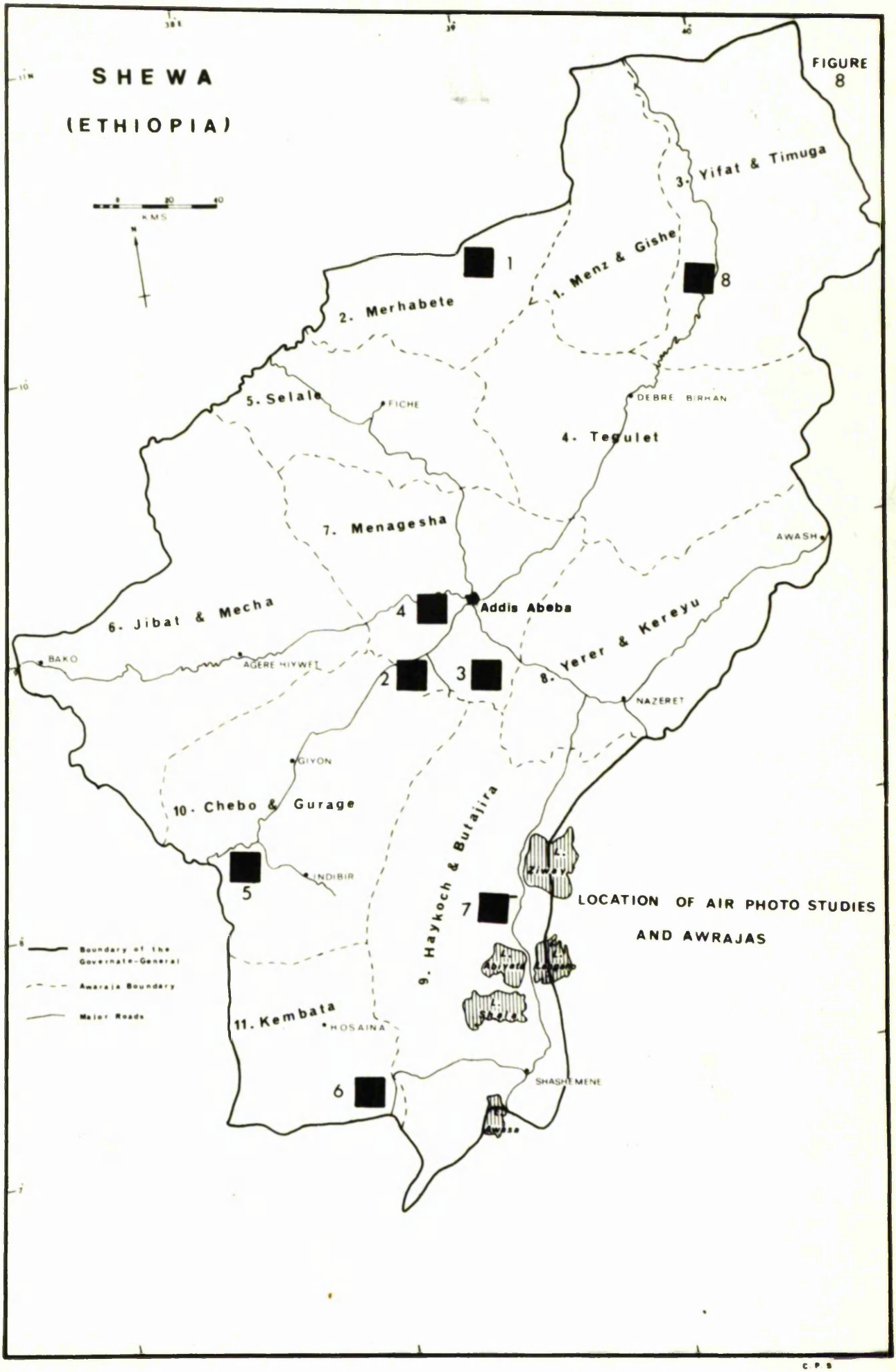
10.4.3 Region 2 - Type 4a-6a Crop Rotation With Used Unimproved Grazing

10.4.3.1 Introduction

Type 4a-6a, hereafter called as Region 2, covers about 25,008 square kilometres, or 37.5%, of the Shewan Plateau (Appendix 10 Table 2). Its natural boundaries have been marked in the north and west by the beginning of the eroded region of ambas and river valleys, in the east by the edge of the escarpment of the Shewan Plateau, and in the south by the ensete producing region of Gurage-Kembata plateau. Addis Abeba is located in almost the centre of this region. Most of the places of the region lie within a radius of about 150 kilometres from Addis Abeba, though the longest distance recorded along the all-weather roads was 180 kilometres along Addis Abeba-Debre Markos road at Goha Tsion, as the roads on the undulating plateau are by no means straight.

This region includes the whole of Menagesha awraja, a greater part of Selale awraja, nearly half of Tegulet & Bulga and Jibat & Mecha awrajas. Small parts of Yerer & Kereyu, Haikoch & Butajira and Chebo & Gurage awrajas are also included in the region.

The general elevation of Region 2 is between


SHEWA
(ETHIOPIA)
FIGURE 8
KMS
1. Menz & Gishe
2. Merhabete
3. Yifat & Timuga
4. Tegulet
5. Selale
6. Jibat & Mecha
7. Menagesha
8. Yerer & Kereyu
9. Haykoch & Bulajira
10. Chebo & Gurage
11. Kembata
Addis Abeba
FICHE
DEBRE BIRHAN
AWASH
BAKO
AGERE HIYWET
NAZERET
GIYON
INDIBIR
HOSAINA
SHASHEMENE
Boundary of the Governate-General
Awaraja Boundary
Major Roads
LOCATION OF AIR PHOTO STUDIES AND AWRAJAS

2,000 and 3,500 metres. Almost the whole of the region is undulating and there are no sudden changes of altitude as is the main feature of Region 1. There are a few peaks which rise above 3,500 metres such as Woti (3,677 m.) and Megezez (3,596 m.), both of which are located along the escarpment of the Shewan Plateau. There are also smaller volcanic mountains like Wachacha, Yerer, Furi and Gorfu, all of them in the vicinity of Addis Abeba, which rise higher than the surrounding plateau. The whole of this region has been formed from lavas outpoured at different times. Most of the rocks of this undulating plateau belong to Trappean Series, while Wachacha, Yerer and Furi etc. are of later age. Mt. Zuquala, with its crater lake (Air Photo 3), also belongs to volcanoes of a later age. On the whole, the topography consists of a large undulating plateau with a few higher peaks and mountain ranges. No part of the region is lower than 1,500 metres.

Though some of the major rivers of Ethiopia or their tributaries originate on this plateau they are not large rivers within the region. They flow out as large streams and are generally not used for irrigation. Awash is the most prominent of these rivers but it is not bigger than a stream in dry season in its upper course in the region. Other somewhat well known rivers of this region are Akaki, Dukem, Mojo etc.

Among the other water bodies in the region there lakes like Gefersa (Air Photo 4) and Aba Samuel which are used for water and electric supply for Addis Abeba. The other lakes are the explosion crater lakes of Debre Zeit and the crater lake of Mt. Zuquala.

Temperatures over most of the region are between

15° and 21°C depending upon the altitude. The mean annual temperature at Addis Abeba is 16.3°C which never varies more than 2°C in any month of the year. Debre Zeit, which is about 858 metres lower than Addis Abeba, has an annual mean temperature of 18.6°C with a maximum variation of about 2.5°C (Appendix 3). On the other hand, Debre Birhan, located at an altitude of 2,840 metres has a mean annual temperature of 15.22°C.

The total annual rainfall in this region varies from 1,050 mm. to nearly 1,400 mm. depending upon the location. Those places which are located on the western margins of the region have higher rainfall, such as Fiche (1,397.9 mm.) while Chacha and Addis Abeba have 1,064.7 mm. and 1164.2 mm. respectively (Appendix 7). There are two rainy seasons from July to September and March to April.

The altitude and undulating nature of the plateau, comfortable climate and volcanic soils make it one of the most favourable areas for human habitation. Both the Amharas and Gallas tried to capture this core of the Shewan Plateau and there were wars between the various ethnic groups. Eventually, in the last century, the Amharas and Gallas started living peacefully with each other and later intermarriages between the two became quite common. The assimilation of the two ethnic groups has taken place to such an extent that it would be correct to call it and Amhara-Galla region. There are hardly any other ethnic groups, except in the towns. The Amharas brought sedentary agriculture to this region which was adopted by the pastoral Gallas.

The establishement and development of Addis Abeba and the railway station towns affected the land use in the region

INDEX

6 Crop Cultivation on Flat Plateau

7 Grazing on Comparatively Lower Land

INDEX

1	Crater Lake	2	Dense Vegetation in the Crater
3	Rim of the Crater	4	Terraced Farming
5	Grazing on the Slopes	6	Clearings for Cultivation
7	Grazing	8	Cultivation on Flat Plateau Around Mt. Zuquala

INDEX

1 Eucalyptus Plantations
2 Crop Cultivation with Eucalyptus Plantations
3 Crop Cultivation without Eucalyptus Plantations
4 Grazing
5 Lake Gefersa
6 Addis Abeba

considerably. Several commercial farms came into existence all along the Addis Abeba-Nazret road to supply vegetables and fruits to these towns. The whole surrounding of Addis Abeba, and along the major all-weather roads near the capital, the eucalyptus plantations were established (See Air Photo 4). Many crops in the region are grown to be sold in Addis Abeba and other towns, such as teff and wheat. In fact, Addis Abeba has affected the land use pattern in the distant Awash Valley as well as in several parts of the Shewan Plateau.

There are five all-weather roads in the region which provided better opportunity for conducting interviews with farmers than the other regions. Consequently, 93 farmers were interviewed in this region which is the highest number of farmers interviewed in any region. Roads passing through the different parts of the region made it easy to interview people in several parts of the region. As a result, Region 2 has been covered rather completely than other regions.

10.4.3.2 Farm Type

Most of the farms of this region are upland farms. The figures of farm type show that the percentage of such farms is more than 91%. This is the highest percentage of upland farms in any region of the Shewan Plateau (Appendix 17 Table 1). The percentage of lowland farms is quite insignificant (3.16%), because the general elevation of the region is more than 2,000 metres above sea level.

10.4.3.3 Farm Size

This region has the highest number of farms with an area of between 0.50 and 2.25 gasha (20 and 90 hectares). The

percentage of such holdings is 63.16% (Appendix 17 Table 2) which is also the highest percentage of holdings of this size in all the regions. This percentage is highest in Selale awraja (80%) while Menagesha awraja has about 59% of such holdings and Tegulet and Bulga awraja only 51% (Appendix 18 Table 2).

In fact most of the farms in Selale awraja are as big as 0.50 to 1.00 gasha (20 to 40 hectares) in size. The number of farms which are upto 2.00 gasha (80 hectares) is very small. In Menagesha awraja the number of farms between 0.50 and 1.00 gasha (20 and 40 hectares) is quite large but there are only few farms which exceed 1.00 gasha (40 hectares) in area. In Tegulet awraja also there are very few farms which are as big as 1.00 gasha (40 hectares).

It is interesting to note that the percentage of small holdings in this region is the lowest in all the regions. Only about 26% of the farms ar less than 0.50 gasha (20 hectares). But considering them by awraja the situation does not seem to be as good in some awrajas, particularly in Menagesha awraja where the percentage of small holdings rises to 31% (Appendix 19 Table 2). From the same figures it also emerges that Selale has the lowest percentage of as small holdings as 0.50 (20 hectares). It has only 15% of farms of this size. It is about 11% lower than the average of such holdings in the region. Thus Selale has a greater number of farmers of larger holdings while Menagesha has the lowest.

Large holdings of more than 4 gashas (160 hectares) are very few in the region (3.16%)(Appendix 16 Table 2). This is the smallest percentage of large holdings in all the regions. The

figures of farm size in different awrajas show that Selale and Menagesha awrajas have no holdings larger than 160 hectares. Even holdings of between 90 and 160 hectares are very few.

10.4.3.4 Ownership/Tenancy

Figures of ownership/tenancy in this region show that it has the highest percentage of tenant farmers in all the regions (40.09%). This is nearly 11% higher than the overall average of 29.41%. The rest of the farmers are land owners in one way or the other. Among such farmers 10.75% are 'gebbar', 25.81% 'riste gult' and 23.35 % others (Appendix 17 Table 22). All of these farmers pay taxes directly to the government and are owners of their land.

Tegulet awraja has the highest percentage of tenant farmers while Menagesha has the lowest. More than half of the farmers in the other two awrajas, Selale and Jibat & Mecha, which fall in this region also have more than half of the farmers as tenant farmers. Therefore, a majority of farmers in all the awrajas of this region, except Menagesha, are tenant farmers. In most of these awrajas they number more than 55% (Appendix 17 Table 22).

10.4.3.5 Land Utilisation

More than 77% of the land in this region is under cultivation (Appendix 11). This is the highest percentage of area under cultivation in all the regions. As would be seen from Air Photograph 2 this flat plateau-land is cultivated intensively. Very little land is left as grasslands (about 12%). People live all over the undulating plateau in groups of families. There are large tracts of land which are cultivated all around the dwellings. For thousands of square kilometres the plateau in this region is

Plate 5.1 Harvesting barley north of Debre Birhan

5.2 Farming on the plateau between Addis Abeba and Agere Hiywot

5.3 Farming on the high plateau in Selale

5.4 Eucalyptus wood being transported by truck to Addis Abeba

5 - 1

5 - 2

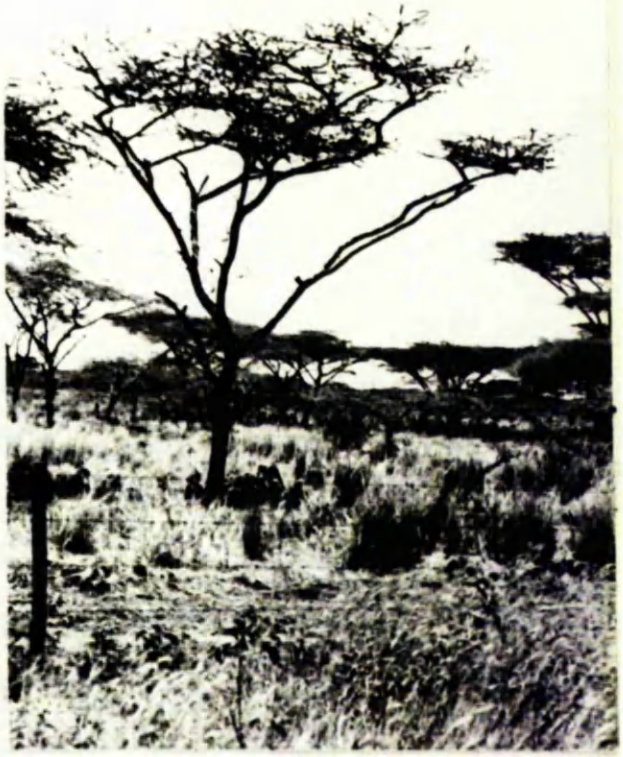
5 - 3

5 - 4

6 - 1

6 - 2

6 - 3



6 - 4

Plate 7.1 Deforestation on steep slope in the Abay gorge

7.2 Deforestation in Galla Lakes region

7.3 Terracing by stones in the Abay gorge

7.4 Collection of cow dung near the stone wall of houses near Debre Birhan

7-1

7-2

7-3

7-4

nearly flat or slightly undulating. The whole landscape has intensively cultivated fields, scattered tukuls and someitmes tinned-roofed houses belonging to the more affluent people, with eucalyptus stands nearby (Air Photo 2).

The land is generally left fallow after each harvest. The length of fallowing depends on the quality of land. The generally fertile land is fallowed only for a few months. But those fields which are waterlogged in the rainy season, such as the area around the Teji swamp, the land is left fallow for several yeabs before another crop is planted.

Very little land is devoted to grasslands, the questionnaire survey indicates about 12%. Only such area which is not suitable for cultivation is left as grasslands. The farmers find it unnecessary to leave the land for grass only as their cattle mostly graze on the land which is under fallow. However, there are some areas which are not cultivated and they are under grass throughout the year, such as the large grasslands before Chacha on Addis Abeba-Debre Birhan road (Plate 6.1 on page 135). Large herds of cattle can be seen grazing on these grasslands.

The area under woodlands is still smaller (6.63%). People grow a few eucalyptus trees near their tukuls for wood for construction and fire. The woodlands are always larger near the towns. Around Addis Abeba large plantations of eucalyptus are grown to meet the demand of the capital (Air Photo 4). This is the largest area under eucalyptus in the whole of Shewa. Most of the hills surrounding Addis Abeba are covered with eucalyptus plantations. The wood is transported by mules from nearby plantations while trucks are used to bring trees from long distances (Plate5.4)

Very little area is under horticulture in the countryside. Vegetables and fruits which are grown on commercial farms for Addis Abeba have been considered under Type 2 (See page 97). In the rural areas an insignificant area of about 0.50% is under vegetables and only 0.06% under fruits (Appendix 11). It should be noted that this is the smallest percentage under horticulture in all the regions.

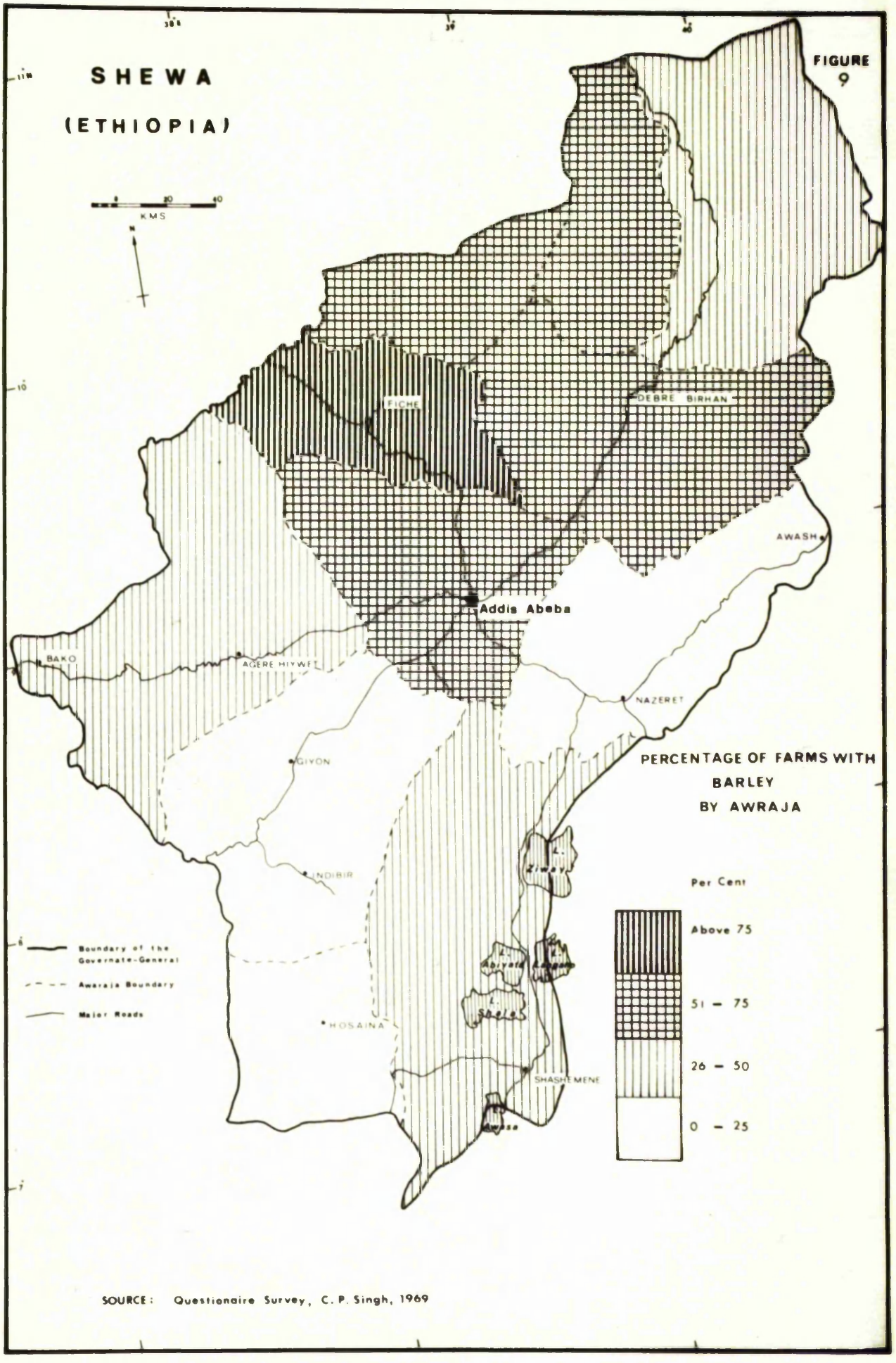
The total area irrigated in this region is only 2.23% (Appendix 11). The rivers which flow over this flat plateau are small and for most of the part of the year their volume is very small. The percentage of farms which never use irrigation is about 92% (Appendix 16 Table 8). Obviously farming in this region is ~~also~~ dependent upon the rains which are unreliable and uneven.

Jibat & Mecha awraja has the highest percentage of farms using irrigation (12.90%). On the other hand, the percentage of irrigated farms is smallest in Menagesha awraja (6.90%), while Tegulet and Selale awrajas have 11.11% and 10.00% of irrigated farms respectively.

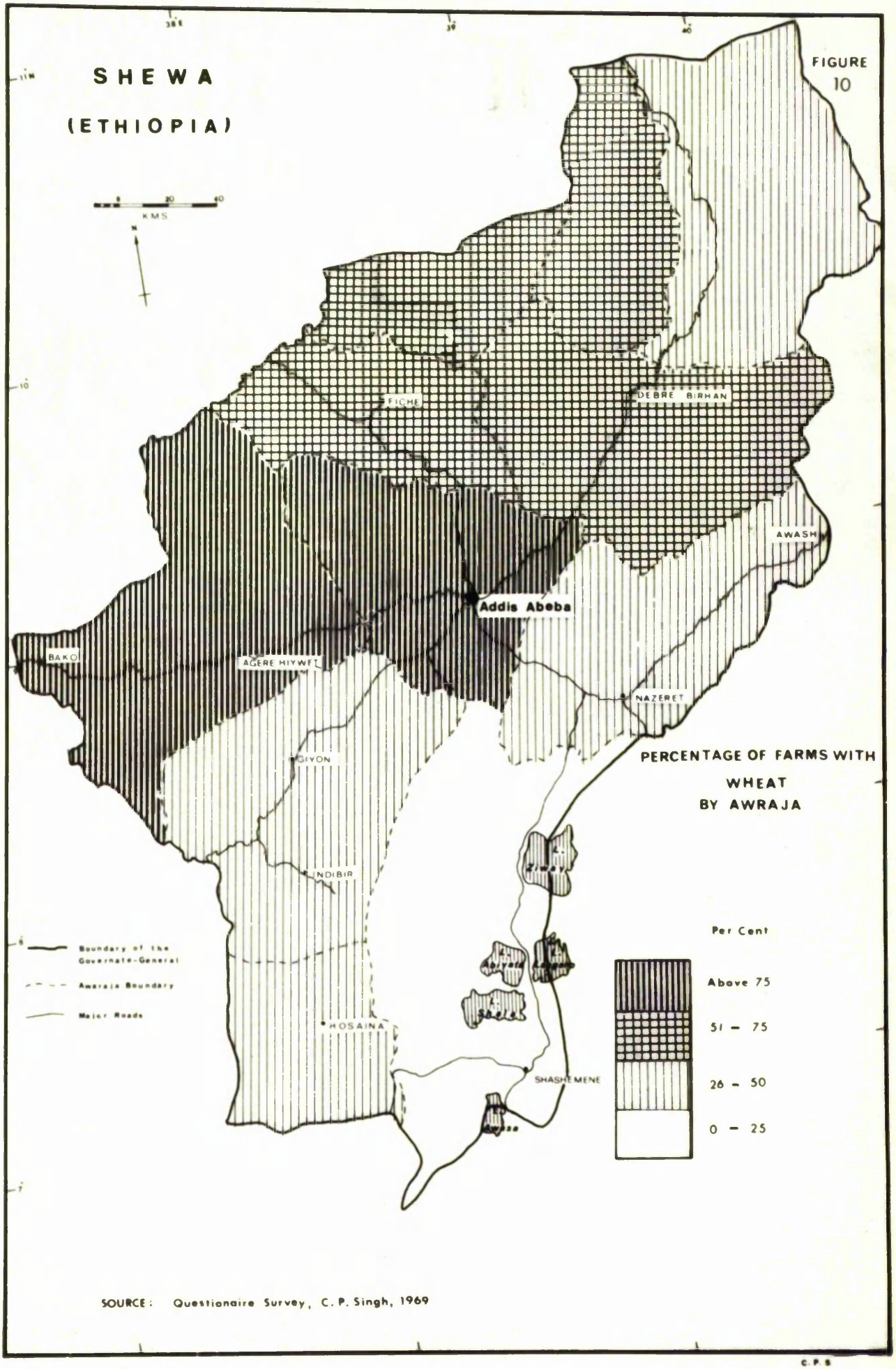
10.4.3.6 Crops

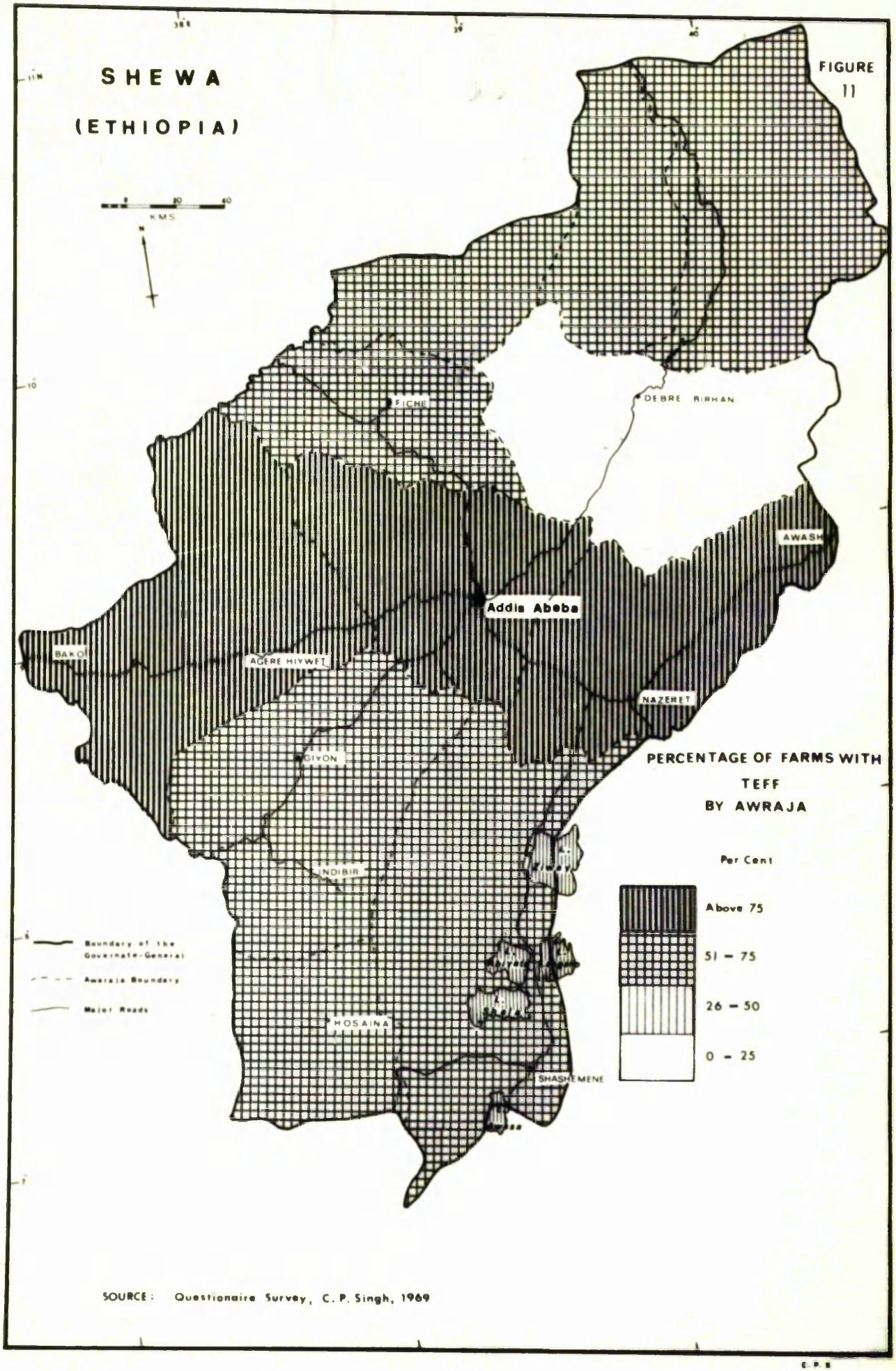
Since the altitude of this region is generally over 2,000 metres above sea level highland crops like barley, wheat, teff, beans etc. are grown over a larger area. In places which are lower than 2,000 metres wheat, chick peas, peas etc. are grown. In still lower places maize and sorghum are grown but such places are very few in this region.

The figures of crops (Appendix 17 Tables 4-13) show that barley and teff are grown in 65% of fields in the higher parts of the plateau. But wheat is the most widely grown crop of



SOURCE: Questionaire Survey, C. P. Singh, 1969


SHEWA
(ETHIOPIA)
FIGURE
10
KMS
FICHE
DEBRE BIRHAN
AWASH
Addis Abeba
BAKO
AGERE HIYWET
NAZERET
GIYON
PERCENTAGE OF FARMS WITH
WHEAT
BY AWRAJA
NDIBIR
Per Cent
Above 75
51 - 75
26 - 50
0 - 25
Boundary of the Governate-General
Awaraja Boundary
Major Roads
HOSAINA
SHASHEMENE
SOURCE: Questionaire Survey, C. P. Singh, 1969


SHEWA
(ETHIOPIA)
FIGURE
11
KMS
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Addis Abeba
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NAZERET
GIYON
INDIBIR
HOSAINA
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PERCENTAGE OF FARMS WITH
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Above 75
51 - 75
26 - 50
0 - 25
Boundary of the Governate-General
Awraja Boundary
Major Roads
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this region. It is grown in the lower as well as the higher parts of the region, though on the farms located on very high altitude only barley is grown. This is the most favoured region for the production of wheat in all the regions. Wheat is grown on about 81% of the farms.

Beans are also widely grown (on 61% of farms) while peas are grown on more than a third of the farms. In the poor soils and on the leeward slopes chick peas are grown. The percentage of farms growing chick peas is highest in this region (47.37%). It is also grown on the black clays to the south of Addis Abeba. The reason for such a high percentage of chick pea farms is that it forms an important item of the traditional Ethiopian diet. It is used for 'wot' sauce, making bread and roasting. Addis Abeba has a large demand for chick peas and therefore so many farms in this region grow chick peas.

Sorghum and maize are the least grown crops. Sorghum is grown on only about 7% of farms while maize on about 13%. It should be noted that about 3% of the farms in this region grow ensete. Such farms are located near the ensete producing region. But coffee is not grown at all.

Tegulet and Selale awrajas are the barley producing parts of the region. Wheat is produced in Menagesha, Jibat & Mecha and Selale awrajas. In Menagesha it is the most widely grown crop where it is grown on more than 93% of the farms. Jibat & Mecha and Menagesha awrajas have the highest percentage of farms under teff. Agere Hiywot in Jibat & Mecha awrajas is among the most famous places for teff. For chick peas also both of these awraja are the prominent producers. But peas are more widely grown in Selale awraja

(See Appendix 19 Tables 4-13).

Some of the farmers in Menagesha and Jibat & Mecha awrajas grow ensete. In both of these awrajas the percentage of ensete producing farms is about 10%. Except in Jibat & Mecha awraja coffee is not grown in this region at all. Even in this awraja there are only 6% of farms which grow a little coffee.

10.4.3.7 Crop Rotation

The crop rotation system varies slightly from one part of the region to another. But basically it remains the same everywhere, i.e., the main food crops are followed by leguminous crops. Land is left fallow for some time between the harvest of one crop and planting of the next. In Tegulet awraja, which is a barley producing area, barley is rotated with beans. In Selale awraja also similar rotation is practised. But in Jibat & Mecha and Menagesha awrajas teff or wheat is rotated with chick peas. The rotation continues almost the same year after year. But fields with poor soils are left fallow for considerably long time before the second crop is planted in them.

10.4.3.8 Soil Conservation and Enrichment Practices

Though Region 2 is not as severely eroded as Region 1 soil erosion is very active over most of the plateau. There are rarely any areas which are absolutely flat. Gullies are formed over the whole landscape in the rainy season. Air Photo 2 shows that even in this apparently flat region small streams and gullies have eroded a considerable part of the area. Farmers seem to be unaware of the dangers of soil erosion as most of them do not use any soil conservation measures. This contrasts with an awareness of such dangers evident in Region 1.

The figures of soil conservation practices show that more than three fourths of the farmers do not use even contour ploughing which is essential in an undulating region like this. Very few farmers practise bunding and terracing to protect the soil from erosion, and in some awrajas such as Tegulet and Jibat & Mecha there are as many as 33% of the farmers who do not know the advantages of contour ploughing. (Appendix 17 Tables 14-18 and Appendix 19 Tables 14-18). Menagesha and Selale awrajas, however, have around 30% of farms on which contour ploughing is done.

Nearly half of the farmers use manures to maintain the fertility of the soils. Other than this about 30% of the farmers use grass burning as a means of soil enrichment. This practice is more common among the farmers in Tegulet awraja. Chemical fertilisers are not used at all.

10.4.3.9 Livestock

Animal husbandry plays an important part in the economy of rural Shewa. There are numerous useful domestic animals, such as cattle, sheep, goats, horses, mules, chicken etc. which are kept for milk, meat and money. Their importance to the farmers can be seen from the fact that sometimes taxes were levied according to the number of oxen and heads of cattle held by the farmer. It is for this reason that some of the farmers may not have given the correct number of their cattle during the interviews.

The figures of the cattle show that there are 0.97 sheep, 0.41 goats, 0.61 cows, 0.68 chicken and 0.40 ox per resident in the region (Appendix 15). It was found that 20% of the farmers had no cows or oxen at all, a lower proportion than in other regions (Appendix 16 Tables 11 and 13). Most of the farmers in this region

have less than 10 oxen. There are no farmers who have large herds of cattle as is clear from Appendix 16 Tables 11 and 13. The percentage of farmers who have 10 to 20 oxen is as low as 1%. It can, therefore, be concluded from these figures that there are no farmers with large herds of cattle and that about one fifth of the farmers have no cattle at all.

The tables showing the sufficiency of water and grass (Appendix 17 Tables 25 and 26) show that there is a shortage of both of these necessary items for the cattle. The percentage of farms where the supply of water for the cattle is insufficient is more than 28%, and of grass 39%.

Jibat & Mecha and Tegulet awrajas have an acute shortage of water for cattle. On the other hand, in Selale awraja the availability of water is generally satisfactory and only 10% of the farms there face water shortages.

But the problem of the availability of grass in some awrajas is very acute. For instance, in Tegulet awraja more than 55% of the farmers do not have sufficient grass for their cattle. (Appendix 18 Table 26). In Selale and Jibat & Mecha awrajas this percentage is 45.00% and 32.26% respectively. The reason for the shortage of grass is that most of the area is high plateau-land with a montane savanna type of vegetation. Tiny grass of 30-80 cm. height grows all over the region. The grass dries up soon after the rains and no fodder crops are grown to meet this shortage of grass.

The quality of the cattle is very poor and several diseases are prevalent among them. The most common cattle diseases in this region are: anthrax, rinderpest, liverfluke and blacklag etc.

Though cattle of about 84% of farmers were innoculated at least once it is insufficient. They need regular checks and veterinary care.

10.4.3.10 Food Consumption Pattern

This is predominantly a region of the Amhara-Galla peoples, who are grain cultivators. But there is also a very small group of people who cultivate ensete. The figures show that nearly 97% of the people eat cereals like teff, barley, wheat, chick peas etc. Ensete is always eaten along with cereals in this region and even the 3% of ensete eating people do not eat ensete alone. It is mostly eaten in Jibat & Mecha awraja (Appendix 19 Table 34), which is next to the main ensete growing region. Rest of the awrajas of this region have cereal eating people.

Meat is eaten only once in a while by the majority of people. However, there are about 24% of the people who eat meat either daily or once or twice a week (Appendix 17 Table 29). On the other hand, there is a small percentage of people (1.05%) who do not eat meat at all. Figures of meat consumption in each awraja show that a large majority of people in Selale and Tegulet awrajas get meat rarely. At the same time, more than a third of the people in Tegulet awraja eat meat at least once or twice a week. But in Selale awraja there are only 10% of the people who eat meat only about once a month. This is the only awraja of this region where some people (5%) do not get meat to eat. On the whole, meat is eaten only once or twice a month by a large majority of people in this region.

Therefore most of the people either eat vegetables or lentils. The questionnaire survey showed that about two thirds

of the people in the region eat vegetables; others do not eat them at all, or in other words, vegetables are not available to about one third of the people of this region. The highest percentage of vegetable eating people live in the Jibat & Mecha awraja, while in Selale awraja, where the people get the least meat to eat, 55% of the people do not get vegetables. But in Menagesha the percentage of people who never eat vegetables is only 17%. The percentage of people who eat vegetables daily in tthis awraja is also the same. The rest of the people eat vegetables on several occasions. The reason for the better supply of vegetables is that Addis Abeba is located in this awraja and vegetables are grown in the countryside to be sold in the capital.

More than half of the people do not eat fruits at all. There are only about 8% of the people who eat fruits daily or once or twice a week, and they mostly belong to Menagesha and Jibat & Mecha awrajas. It is in these awrajas that some of the fruit gardens are located which send most of their products to Addis Abeba.

Milk and milk products are available to nearly 97% of the people, though only 39% drink milk every day. A great majority of people drink milk at least once or twice a week. In most of the awrajas milk is available to drink ever day or once or twice a week. But milk products are not so frequently available. It is only about 55% of the people who eat milk products daily or once or twice a week (Appendix 17 Table 33). In Menagesha and Selale awrajas, however, nearly 80% of the people eat milk products daily or once or twice a week. But the percentage of people eating milk products so frequently drops to 44% in Tegulet awraja.

Eggs are eaten only once or twice a week by most of the people. The percentage of people who never eat eggs is 7.47% while those who eat eggs every day are about 12%. In Tegulet awraja none of the farmers interviewed eats eggs.

In most of the awrajas of this region fish is not eaten by more than 55% of the people (Appendix 19 Table 35). In Selale this percentage rises to 100.00%. In none of the awrajas of this region fish is eaten daily. It is because the rivers are small, and many of them are nearly dry for a greater part of the year.

Except Jibat & Mecha and Menagesha awrajas, ensete is not eaten at all. In these awrajas also the percentage of ensete eating people is very small.

10.4.4 Region 3 - 4a-6a (3c) Crop Rotation and Ensete Plantations With Used Unimproved Grazing

10.4.4.1 Introduction

The distinguishing feature of Region 3 is the dependence of its people on ensete plant for their food and on the hoe for cultivation. Ensete is their staple food crop and dominates other agricultural activities of the people. The Gurage, Hadya and Kembata people of this region depend heavily upon ensete for food. Cultivation of grain crops is of secondary importance. Digging in the ensete plantations as well as in the fields under grain crops is done by the hoe.

The region lies between the Omo and Bilate rivers in south-western Shewa covering nearly all of the Gurage-Kembata plateau (Figure 7). Ensete is also grown by a few Gallas in western Shewa who adopted the system of ensete growing from their southerly

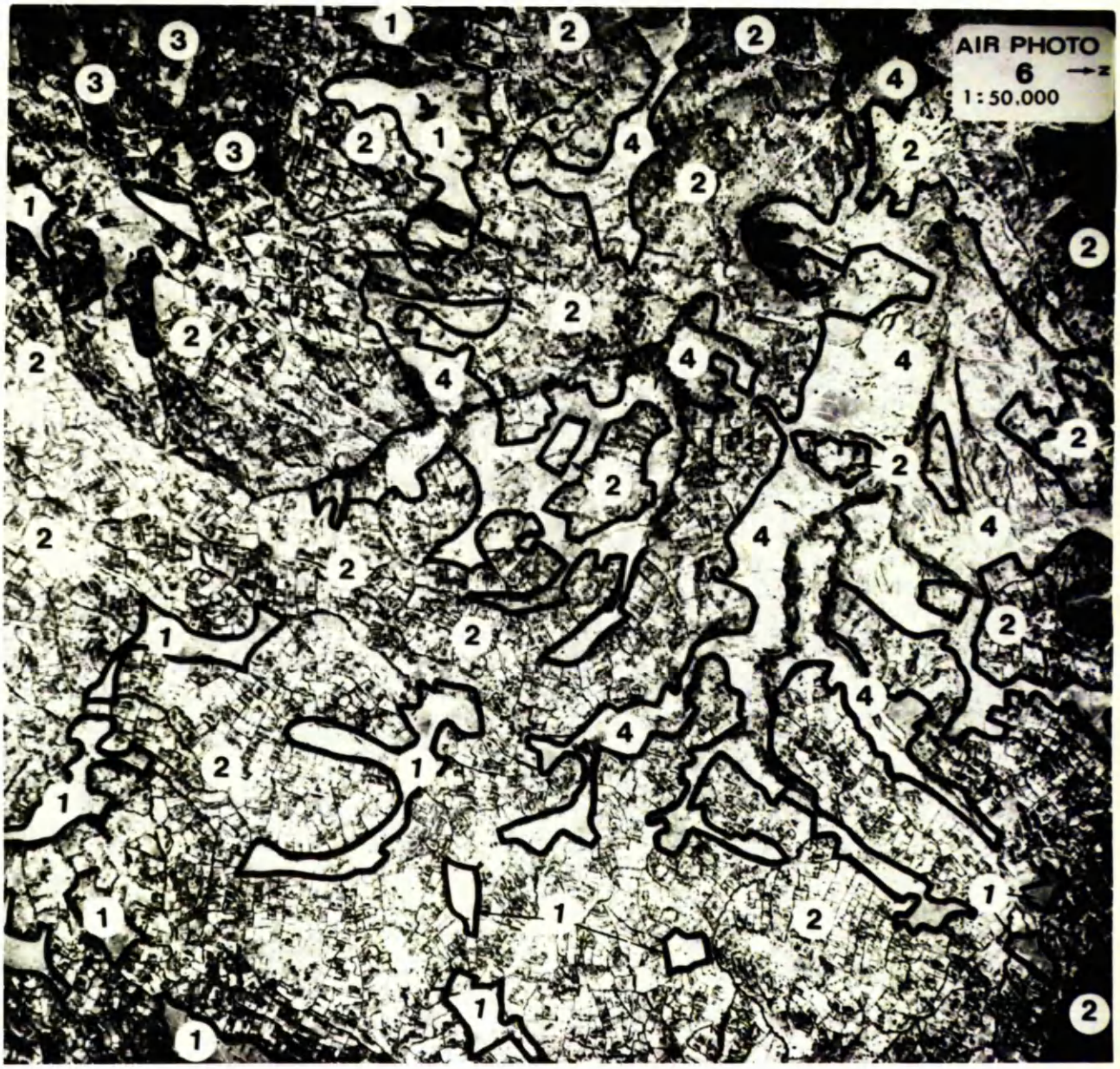
INDEX

5 Cultivation with Ensete Plantations

6 Riparian Vegetation

7 Grazing

8 Grass Burning



INDEX

1 Grasslands

2 Cultivated Land with Ensete Plantations

3 Eucalyptus Plantations

4 Grazing on Eroded Land

neighbours. Therefore, the whole of the area which grows ensete has been included within the land utilisation classification 4a-6a (3c).

In altitude and topography the region is similar to Region 2. The general elevation is between 1,800 and 3,000 metres above sea level. Mt. Gurage (3,719 m.), the highest point in southern Shewa, lies on the eastern boundary of the region. As in Region 2, the topography takes the form of a gently undulating plateau. Due to the tilt of the plateau to the west most of the rivers flow into the Omo. It is a large river and makes a deep gorge which marks the western boundary of the region. Its tributaries are short, but numerous. Most of them are dry for most of the year; while in the rainy season they are flooded. Because the river flow is not controlled the cultivated land is hundreds of metres higher than the bed of the Omo. Consequently neither the Omo nor, in most of the cases, its tributaries are used for irrigation.

Temperature records for the region show that the mean maximum temperature varies from 21° to 27°C and the mean maximum temperature from 6° to 12°C (Appendices 4 and 5). The diurnal range of temperature in the dry months is about 20°C and in the rainy season it is about 11°C (Appendix 6). The rainfall here is generally higher than 1,100 mm. annually, and decreases from north to south. Baco which is the most northerly climatic station in the region for which reasonable records (10 years) are available has 1,248.5 mm. of rain while Silti (16 years) which is located in the south-east of Gurage Mts. has only 1,043.3 mm. (Appendix 7). The rainfall also decreases from west to east. For instance, Hosaina located on 37°33'E has an annual rainfall of

1,168.2 mm. which is about 125 mm. higher than Silti (38°24'E). The entire region has two distinct seasons in a year: the wet, rainy season from March to September, and the dry season from October to February. Within the rainy season the amount and intensity of rainfall varies and accordingly people call the period of high rainfall the 'big rains', and that of lower rainfall the 'little rains'. The 'big rains' last from June to September and the 'little rains' from March to May. During the rainy season internal travel is virtually suspended except on the newly buitl Indibir-Welkite road and the Addis Abeba-Jima highway. On the whole, this region is the wettest part of Shewa.

The Addis Abeba-Jima highway is the most important road through the region. Other all-weather roads are the Welkite-Indibir road in the Gurage area, a small section of the Shashemene-Sodu road in Kembata area, and another small section of the Agere Hiywot-Lekemt road in the north-west. The highest number of farmers interviewed, therefore, were along the Addis Abeba-Jima highway and the Welkite-Indibir road (Figure 7). Since samples were taken along the roads some areas were covered more thoroughly than others. The Gurage area was covered more than the Kembata and Jibat & Mecha awrajas. In all 78 farmers were interviewed in the region; 51 from Chebo & Gurage awraja, 15 from Jibat & Mecha awraja and 12 from Kembata awraja.

10.4.4.2 Ensete and Its Importance In Region 3

Ensete is the staple food crop in about one fourth of the Shewan Plateau, which covers 16,900 square kilometres approximately (Appendix 10 Table 2). As this crop is not known much outside Ethiopia and since it has a special significance and importance in

the life of the people of a large part of Shewa it requires further explanation. Although no accurate population figures for the ensete eating people in Shewa are available, it was clear from field-work that Kembata and Gurage awrajas are among the most densely populated parts of Shewa. A large number of people, therefore, are dependent upon ensete for their food.

Ensete, or Ensete edulis, looks very much like the banana plant (Plate 8.1) and so some call it false banana. It is grown on the plateau at heights between 2,000 and 3,000 metres. The plant can withstand drought for some time. The failure of rain only stops the growth but does not kill the plant. Thus the plant secures the food supply even in years of poor rainfall. Higher altitudes are more favourable for it as low temperatures prevents the plant being diseased.[13] But it does not grow well on very high altitudes above 3,000 metres, nor does it grow well on the lowlands below 2,000 metres.

Ensete is planted around the tukuls. The entire stem of ensete is cut into strips and scraped with a bamboo scraper to make the fluffy substance called 'kocho' (Plate 8.3). The 'kocho' is buried in large holes in the groudn where it undergoes a process of fermentation for about 5 years. The farmers explained that it is sometimes kept for fermentation for as long as 15 to 20 years. 'Kocho' which has feremnted for so long is most desirable. Once fermented the 'kocho' from the holes in the ground provides a constant supply of food and it thus provides security against drought and also against an enemy who does not like to eat ensete.

The plant needs care in the early stages. Once it passes the tender age it can be left much to itself. Later the

Plate 8.1 Tukuls and surrounding ensete in Gurage area. Notice the lack of fields under grain crops on the extensive grasslands near the dwellings.

8.2 Ensete, coffee and maize cultivation in Kembata

8.3 'Kocho', the fluffy substance from ensete

8.4 Farming in the volcanic tuff north of Chubi volcano.

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only labour involved is connected with infrequent weeding and manuring. The relaxed attitude of the Gurages and the Kembatas towards life results from the small amount of labour invilved in raising ensete which nevertheless yields a constant supply of food.

There are many other uses of ensete other than for eating. It is used for making ropes from its dried fibre. Such ropes are used for the construction of tukuls and to tie grazing animals. The green leaves of ensete are used as wrapping materials, and naturally dried leaves are used to wrap butter and cheese.

The settlement pattern also is closely related to the cultivation of ensete. The tukuls of each family are surrounded by ensete plantations all along both the sides of the path which passes through the village (Air Photo 5). This path is generally 30 to 50 feet in width. The distance between the tukuls depends upon the ensete grown between them. Passing along the path one finds an alternation of tukuls and clusters of towering ensete. Such a pattern sometimes continues for long distances along the path and it is sometimes difficult to make out where one village ends and the new one begins. The path generally takes a line along the higher parts of the plateau. Land for cultivation of grain and other crops lies on the slopes behind the ensete plantations. This symmetrical pattern of tukuls and ensete with cultivated fields behind on the slopes is continuous along the path on both sides (See Air Photo 5).

This pattern is typical of Chebo & Gurage awraja. In Kembata awraja this symmetry is broken and people live haphazardly. Here the path, which is not as wide as in Gurage area, is not the

primary consideration in selecting the site of tukul (Air Photo 6). However, ensete cultivation near or around the tukuls is of equal importance. The ensete patch is generally surrounded by cultivated land as far as the farm boundary marked either by neighbouring families, or by grazing land or barren land. The importance of the ensete in this region is that it is always closely associated with settlement. It is not grown far from dwellings(as it is also in Gurage area).

Thus ensete plays a vital role in the economic and social life of the people of this region, and it has been termed as 'ensete culture' region by some authors.[14] Due to the constant supply of food from ensete people in the region have never experienced the shortage of food, and as a result no other emergency crops are grown.

10.4.4.3 Farm Type

Ensete does not grow well in the lowlands as it becomes diseased quickly there. Secondly, it is grown around the tukuls which are mostly established on the higher land for fear of malaria in the lowlands. Therefore, nearly all the ensete growing fields are found on the plateau.

The figures of farm type show that nearly 86% of the farms in this region are upland farms (Appendix 17 Table 1). The rest of the farms do not grow ensete. The percentage of the upland farms drops to 75% in Kembata awraja, but this is still a high proportion of such farms.

10.4.4.4 Farm Size

Farm size varies from small farms in the Gurage area to comparatively larger holdings in the Kembata area. Appendix 18 Table 2 shows that nearly 58% of the farms in Chebo & Gurage

awraja are less than 0.50 gasha (20 hectares) in size. But in Kembata awraja there is no farm which is as small as 0.50 gasha (20 hectares). It should be pointed out that the figures for Kembata awraja belong to the small number of farms visited for interview along the 20 kilometres of all-weather road in this awraja (Figure 7) and they may not be representative of the whole of Kembata.

Since Kembata is the most densely populated awraja of Shewa it can be expected that there are always a considerable number of persons to inherit the land in every generation. It is very likely that the holdings in Kembata may not be as big as my figures show.

In Gurage area, on the other hand, the pressure of population on the land is not as great as in Kembata and people may have larger holdings than the figures indicate. The reason for small holdings in this awraja is the belief of the Gurage people that the soil fertility abruptly ends where the legal limits of the homestead's fields end.[15] Cultivation does not go beyond these socio-economic boundaries. All land outside the boundary of a homestead is held to be unusable for cultivation. Thus each family has its small plot of land allocated around its tukuls. The rest of the land is corporately owned by the village and is used for grazing, which is one of the reasons why nearly 58% of the farms in this awraja are recorded as less than 0.50 gasha (20 hectares) in area. Of the rest, about 39% are between 0.50 and 2.50 gashas (20 and 100 hectares) in size. There are very few farmers with holdings of more than 100 hectares.

On the whole, the proportion of farmers with small holdings is largest in this region. 81.55% of farmers have less

than 100 hectares of land (Appendix 16 Table 2) which in Shewa is too small to provide more than mere subsistence to the owners.

10.4.4.5 Ownership/Tenancy

Region 3 has the lowest percentage of tenant farmers of all the regions, with only 11.54% of such farmers. The rest of the farmers are land owners who were previously either 'gebbar' or 'riste gult' or owned land on other systems. A large majority of people, therefore, pay taxes directly to the government since tenants are not liable to send a tax. This has always presented a problem to the people, particularly to the Gurage, who cultivate ensete and lack a cash crop. Most of the earnings from their small farms goes in taxes which are relatively very high for these people.

The tenant farmers live on the land belonging to the local chiefs and nobility, many of whom live in Addis Abeba and other major towns of Shewa. Figures given by the Department of Land Tenure of the Ethiopian Government show that there are 27.2% of absentee owners in Chebo & Gurage awraja and 13.9% in Kembata awraja.[16]

10.4.4.6 Land Utilisation

Land utilisation figures for Region 3 indicate that nearly 61% of the total farm area is cultivated (Appendix 11). It includes the area under ensete cultivation which depends upon the amount of food needed for the family for several years. The size of the family determines the area and spacing of the ensete plantation. The rest of the area is cultivated for coffee, chat and grain crops. A few secondary crops are also grown between the ensete plants which are generally planted about 3 to 4 metres apart. These subsidiary crops are generally root crops.

The figures also show that a large part of the land is left uncultivated because most of the food requirements of each family are met from the small plots surrounding the tukuls. Ensete, coffee and a few grain crops are cultivated on these plots for subsistence. No effort is made to bring further areas under cultivation for cash crop, such as coffee for which this area is most suitable.

Vegetables form an important part of the diet of the people in this region. Therefore, it has the highest percentage of land under vegetables (about 7%). Each family has its own plot of vegetables like potatoes, tomatoes, sweet potatoes, pepper etc. Vegetables are grown more in Kembata area and are brought to weekly markets to be sold for cash. But fruit is not grown by most of the people as in other regions. On average only 2.21% of the total farm area is devoted to fruit in this region which include bananas and a few wild berries.

Large grazing lands belonging to the whole village are found beyond the limits of the cultivated area (See Plate 8.1). But many farmers have a little land within the limits of their farms which is not cultivated and it is used for grazing the cattle of the family only. Such grasslands constitute an average 17.07% of the total farm area (Appendix 11). This figure is only slightly higher than in Region 2 and nearly 18% lower than the overall average for Shewa. Such grazing is, however, additional to the communal grazing land and so the region does not have a shortage of grazing land.

On the higher ground (above 3,000 metres) the grasslands are more extensive as the cold climate is not suitable for many crops and the cultivated area is smaller. But the grass

is tiny in such areas and is generally insufficient for the cattle. On the other hand, in the lower level savanna grasslands below 2,000 metres provide tall grass for the cattle. This grass, however, withers in the dry seasons.

Beyond the cultivated area, near the rivers, eucalyptus trees are grown (Plate 8.1). The woodlands are small and belong mostly to wealthier people. The total area under woodlands in this region is 7.78% which is the second highest proportion of land under woodlands after Region 1. It is also about 2% higher than the overall average for Shewa.

Irrigation is not carried out on most of the farms. Only 1.30% of farms irrigater their land, in fields near the rivers. The reason for such a small percentage of land irrigated is firstly because the topography of the region makes it difficult to construct ditches and drains to carry the water to the fields. The cultivated land is too high on the slopes to lift water to the height of the fields with present techniques. Secondly, crops like ensete are not irrigated and depend entirely on rains. Also the Gurage and Kembata peoples fear malaria, common at the lower altitudes close to the rivers, and their 'easy-going' attitude mentioned above, is not consistent with the laborous process of irrigation.

10.4.4.7. Crops

Ensete is the most important crop of Region 3. Its importance to the people has laready been discussed. It is grown on about 65% of the farms. In Gurage and Kembata areas nearly all the families grow ensete for their food. But the number of farms with ensete reduces at the margins of the region and very few farmers grow ensete in Jibat & Mecha and Menagesha awbajas.

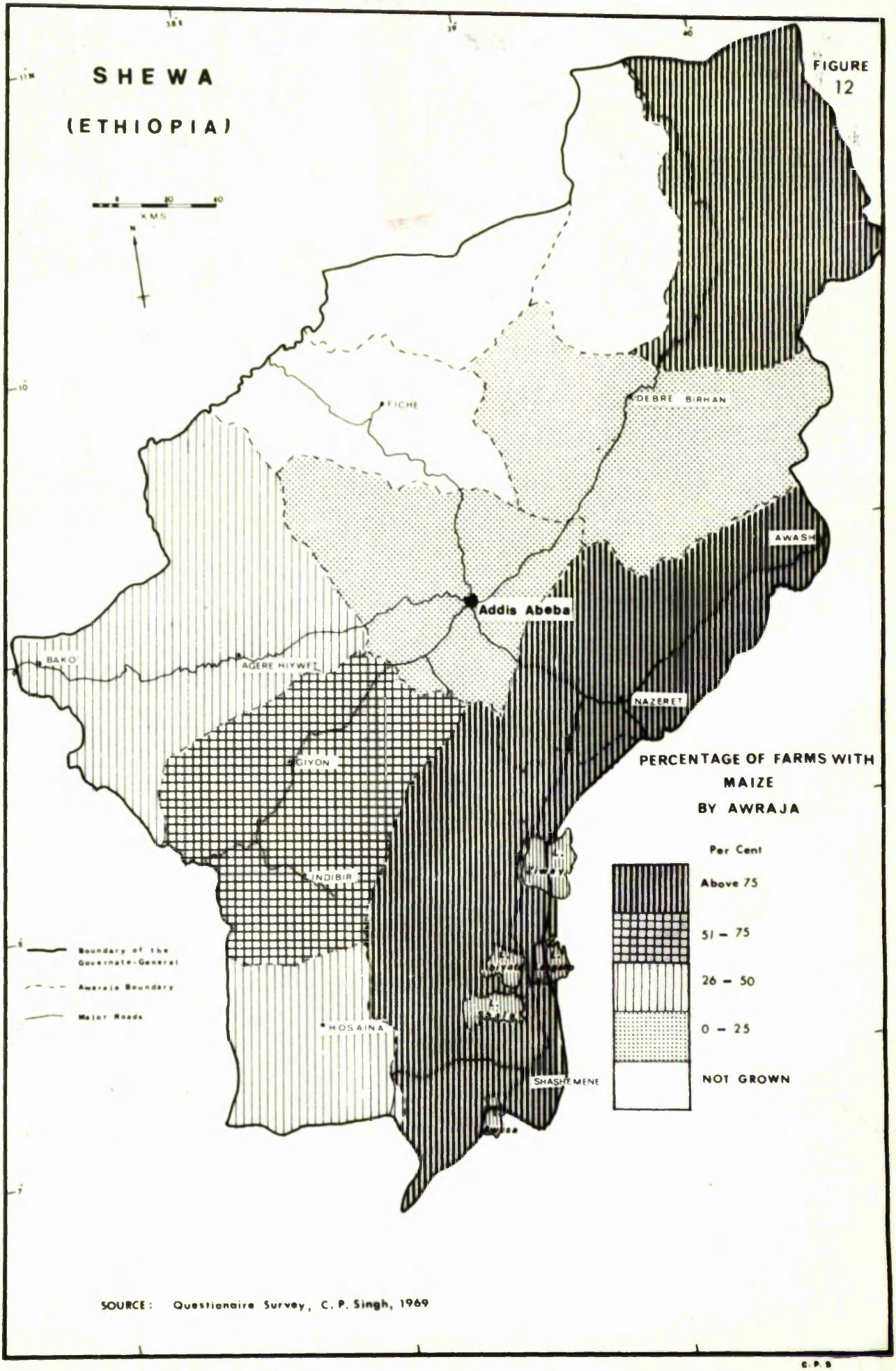
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FIGURE 12
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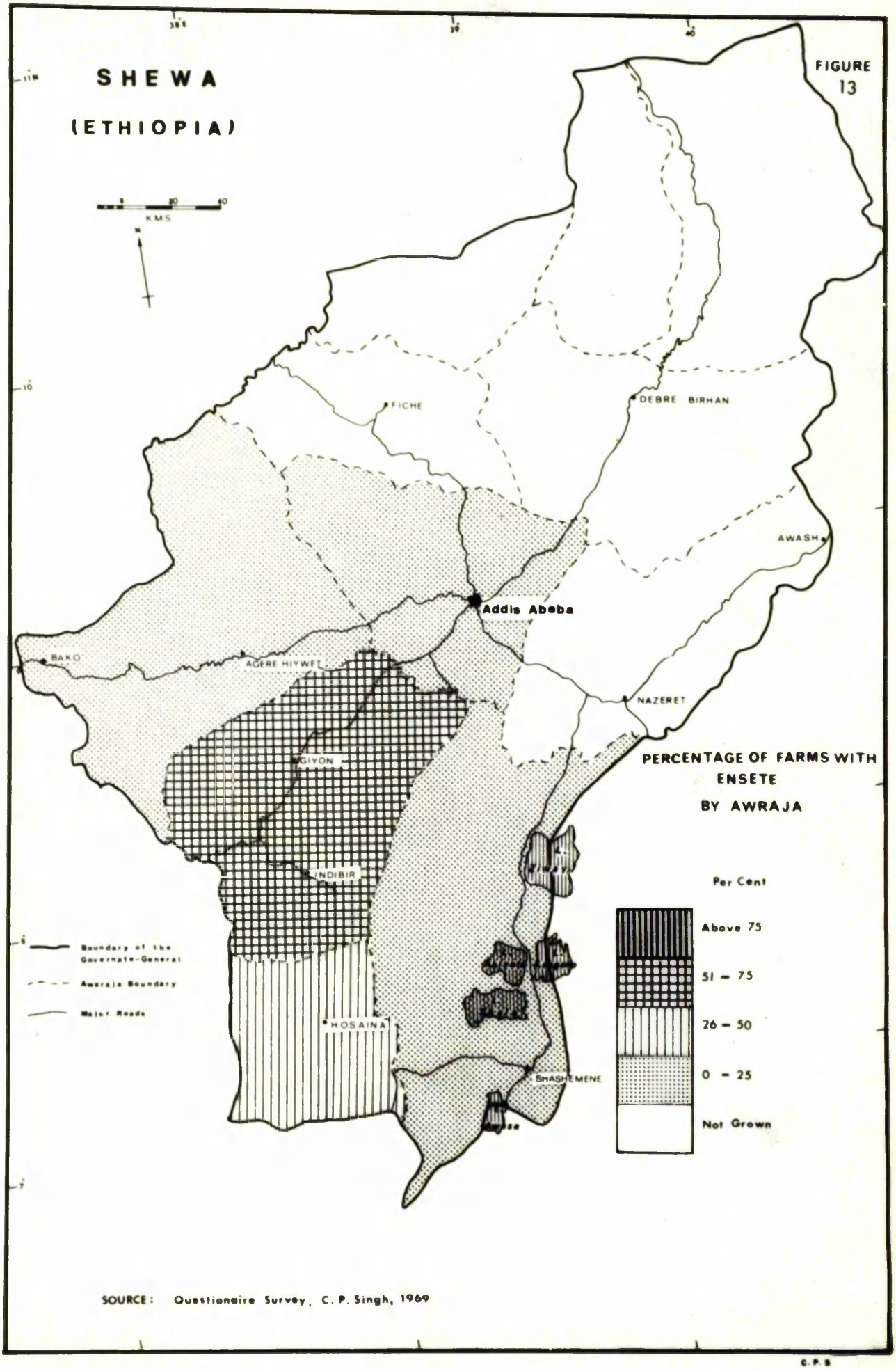
SHEWA
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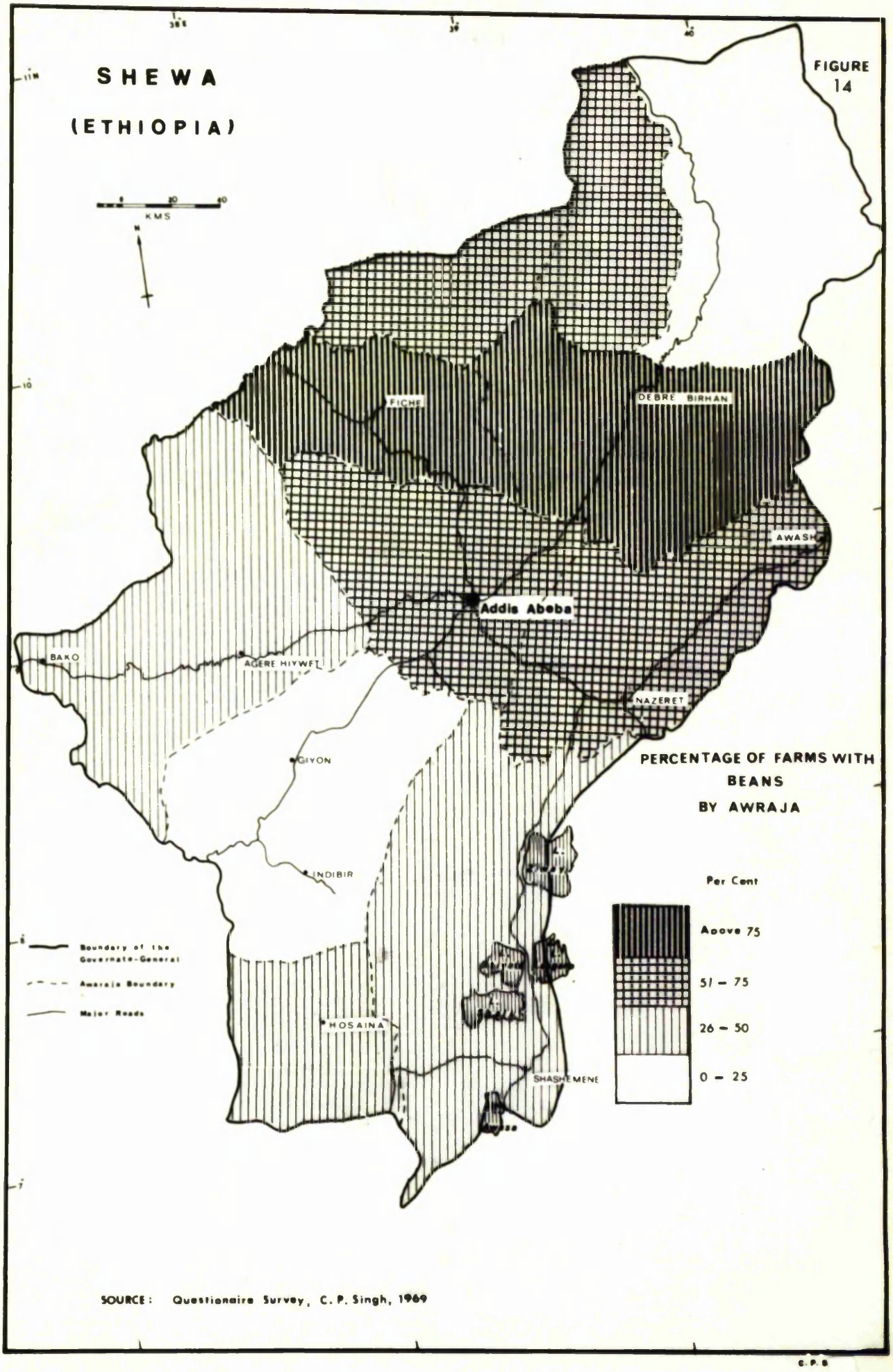
SHEWA
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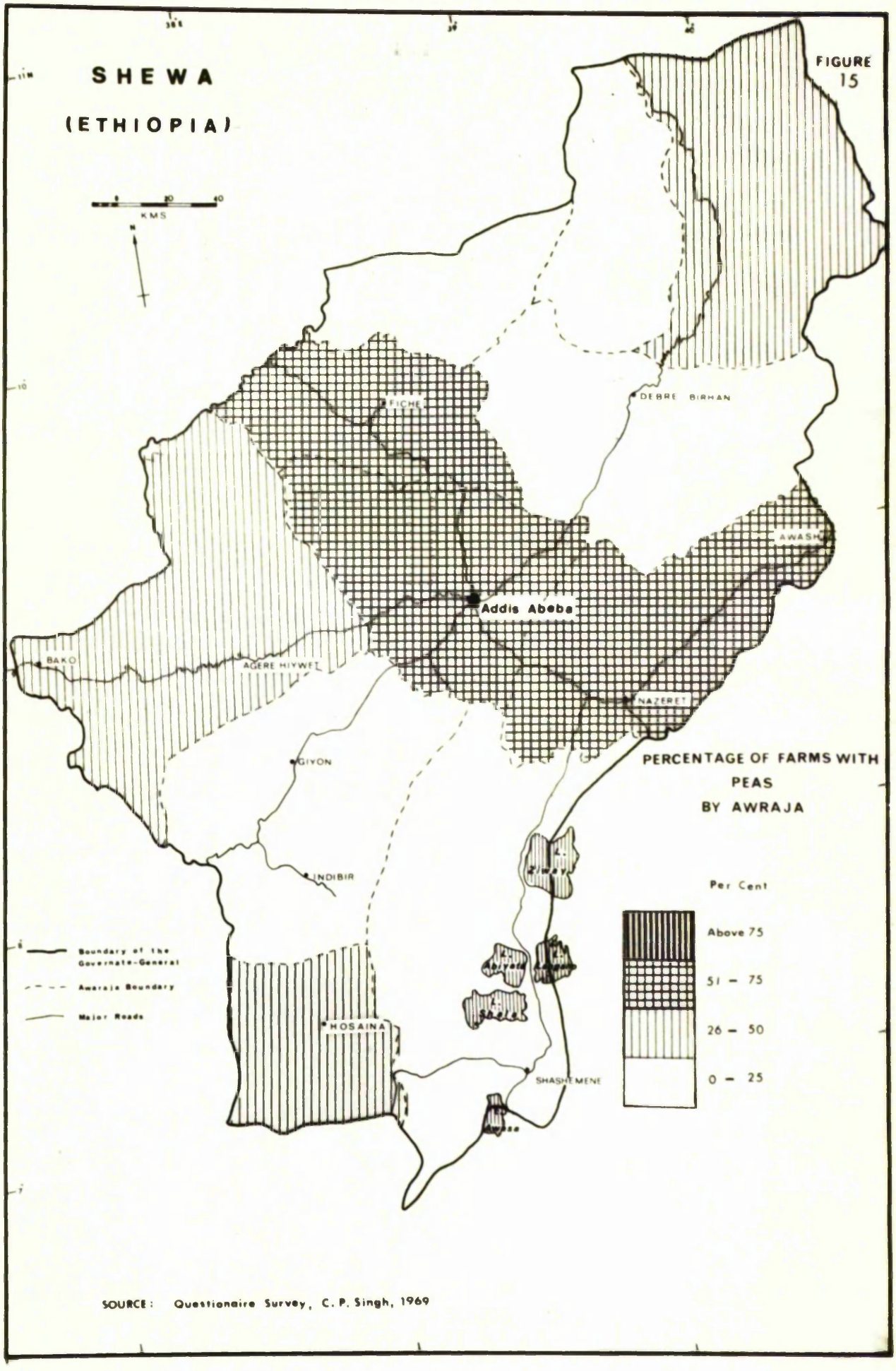
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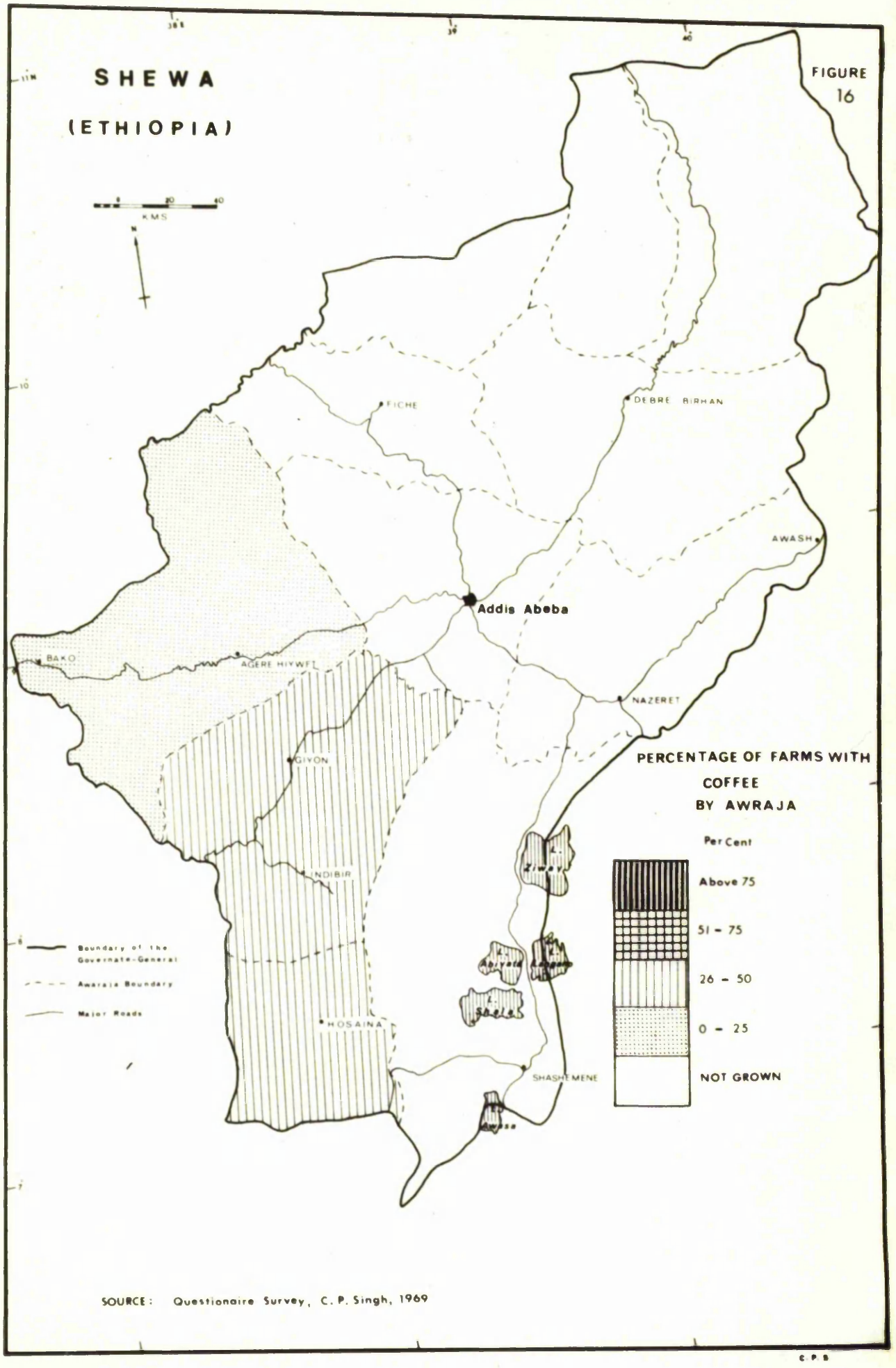
Boundary of the Governate-General
Awraja Boundary
Major Roads
SOURCE: Questionaire Survey, C. P. Singh, 1969


SHEWA
(ETHIOPIA)
FIGURE 16
KMS
FICHE
DEBRE BIRHAN
AWASH
Addis Abeba
BAKO
AGERE HIYWET
NAZERET
GIYON
NDIBIR
HOSAINA
SHASHEMENE
PERCENTAGE OF FARMS WITH COFFEE BY AWRAJA
Per Cent
Above 75
51 - 75
26 - 50
0 - 25
NOT GROWN
Boundary of the Governate-General
Awarale Boundary
Major Roads
SOURCE: Questionaire Survey, C. P. Singh, 1969

The 35% of farms which do not grow ensete in the region are found in these awrajas.

The grain crops in the region are of secondary importance and there are many farms which do not grow them. Wheat, which is the most widely grown crop in the neighbouring Menagesha, is on only 42% of farms. Similarly, barley, the most important crop of Selale and Tegulet awrajas is gown on about a third of the farms of the region. It is mostly grown at higher altitudes along with beans.

Teff and maize are the more widely grown crops which are grown on about 66% and 59% of farms respectively (Appendix 17 Tables 6 and 7). Teff is grown on a few upland farms of Gurage and Kembata areas and on several farms in the Jibat && Mecha awraja. It is grown for making 'injera' bread which is eaten occasionally in several parts of this region. Maize is grown on comparatively lower farms, quite often just next to the ensete farms on the slopes. In the lowlands sorghum is also grown, but it is grown only on 21% of farms.

Other than ensete and grain grops there are a few crops which are grown to serve as stimulants and drinks. Among such crops are chat, 'dagusa' (Eleusine coracana), 'geŝo' (Rhamnus prinoides) and coffee. Chat (Catha edulis) is chewed by a great majority of people and it is also sent to Addis Abeba from here. 'Dagusa' (Eleusine coracana) is grown primarily for beer making, mostly in those parts where barley is not grown. 'Geŝo' (Rhamnus prinoides) is grown to add flavour to the local beer. The area under these crops is very small indeed as they are grown on plots of 3 to 4 square metres.

But coffee is grown on larger area of each farm. Like ensete it is also not grown extensively in Jibat & Mecha awraja

and on the western margins of this region. It is predominantly g grown on the upland farms of Gurage-Kembata region. The figures show that coffee is grown on 42% of farms in the region. In Kembata it is grown on more farms than Chebo & Gurage awraja. This is the only region where coffee is grown on most of the farms. The altitude, soils and climate are favourable over a greater part of Gurage-Kembata plateau. Eastwards the rainfall decreases and the Gurage Mts.-Bilate river rough alignment marks the termination of coffee growing farms. Beyond this the altitude decreases, temperatures are higher and rainfall comparatively lower and therefore unsuitable for coffee.

10.4.4.8 Crop Rotation

On those farms where grain crops are cultivated crop rotation is practised, particularly in Chebo & Gurage awraja. In Kembata awraja, however, almost all the farmers who were interviewed reported that they do not particularly follow any crop rotation system. While planting the next crop they do not have any particular rotation in mind, except the needs of the family. The same crop may be planted again and again in the same field. The reason for not following any rotation is the belief that the soils are fertile and do not need much care. But manure is occasionally scattered in the fields.

In Chebo & Gurage and Jibat & Mecha awrajas the food crops are generally followed by leguminous crops, mainly to maintain fertility of the soils. Teff and wheat may be followed by chick peas, peas and lentils. In a barley field peas may be planted, while in wheat or teff fields beans or lentils may be grown. It is in these awrajas that along with the needs of the family

the fertility of soil is also kept in mind while deciding the next crop to be planted in a field.

10.4.4.9 Soil Enrichment and Conservation Practices

Adding manures to the soils and grass burning are the prominent means of soil enrichment known to people in this region. Chemical fertilisers are unknown.

Manures are most widely used in all the awrajas of the region. It is primarily used in the ensete plantations. Almost all the ensete growing families have their own manure pits which maintain the supply of manure for ensete. Scattering manure in fields under grain crops is of secondary importance and it is done only when some manure is left over from the ensete. Appendix 17 Table 20 and Appendix 19 Table 20 give the percentage of farms on which manures are used. They show that nearly 50% of the farms use manures in this region. In Kembata awraja almost all the farmers use manures while in Chebo & Gurage the percentage of such farmers is considerably lower.

Although grass burning for adding fertility to the soils is not as popular as the use of manures it should be noted that it is used by a small population of people (6.58%). The significance of this proportion is not in the degree to which soils are being enriched as in indicating that the farmers are contributing to the gradual deterioration of the soils in Region 3.

The high amount of rainfall and gentle slopes of undulating plateau have given rise to numerous streams. Erosion is a serious problem and in several parts large areas of land have become barren land (Plate 3). Gully as well as sheet erosion have removed the top soils and they are not suitable even for grasslands.

The inhabitants of this region are doing almost nothing to check this serious threat to the land. There are very few who practise contour ploughing which is necessary on this gently undulating plateau. Similarly, on comparatively steeper slopes very few people use terracing. Afforestation, bunding and grassing are not practised. Appendix 17 Tables 14-18 show that only about 21% of the farmers practise contour ploughing while about 19% use terraced cultivation. Afforestation specifically for preventing erosion is done by a mere 1.32% of the farmers. As a matter of fact, afforestation for checking the soil erosion is not done at all in the Kembata and Chebo & Gurage awrajas (Appendix 19 Table 17).

10.4.4.10 Livestock

Since cultivation is carried out by hoe in Region 3 most of the cattle and other animals reared on the farms are for milk, meat, wool, sking etc. The oxen are mainly reared for their meat on feasts as well as for procreation. Cattle are also kept for providing manure for ensete. The size of the herd depends mostly on the demand for manure for the ensete crop, and also on the availability of grass. If the herd is small it will not meet the demand for manure needed for ensete; and if it is large it will overgraze the communal grasslands creating a shortage of grass for several families. Large grasslands are left for this purpose and no new land can be cleared without the consent of the village.

Because access to grazing land is secure the number of cattle is higher in the region than in Regions 1 and 2, in some cases twice as high. There are 1.58 cows, 1.17 chicken, 0.76 oxen and 0.70 goats per head here. It is only in the case of sheep that Region 3 is lowest of all the regions. There are only 0.39 sheep

per head here. As would be seen later that it is due to the higher number of cattle in the region. Meat, milk and milk products are avaialable, therefore, to a large number of people.

Owing to the large grasslands left for grazing the availability of grass is not a problem. About 71% of the farms have sufficient grass for their cattle (Appendix 17 Table 26). It is the highest percentage of farms among all the regions where the grass is sufficiently available. Even Region 4 which is predominantly a savanna region does not have such a high percentage of farms with sufficient grass.

In the availability of water for the cattle this region is still better situated. There are nearly 74% of farms with sufficient supply of drinking water for the cattle (Appendix 17 Table 25). But this is nearly 8% lower than Region 1 which has numerous large rivers. The reason for such a high percentage of farms with a satisfadtory water supply is that mostly the tukuls and cultivated land is established near the river courses. Generally the cultivated land on which grain crops are planted is not too far from the river bed.

Although the supply of water and grass is sufficient on most of the farms the quality of the cattle is poor and several diseases are prevalent among them. The most common disease are anthrax, rinderpest, blackleg, mastites, liverfluke etc. Though nearly 73% of the cattle have been innoculated at least once they need checks and care.

10.4.4.11 Food Consumption Pattern

Since Region 3 is the ensete culture region ensete is eaten by the majority of people. More than 85% of the people

eat ensete bread either daidy or once or twice a week (Appendix 17 Table 34). There are only 5% of the people who never eat ensete. Thus a constant supply of food is available to the people of the region in the form of 'kocho'. However, the nutritive value of ensete in a normal diet in the region is only 224 calories per person per day.[17] It has been estimated that the total calorie intake in the ensete producing region is about 1,400 calories per person per day which is much lower than the required level of 3,500 calories per person per day, according to the Central Statistical Office, Addis Abeba.[18] 1,400 calories compares unfavourably with the grain producing regions where the total intake is 2,152 calories per person per day.[19] Thus despite the apparent sufficiency of food from ensete in the region there is considerable malnutrition among the people which begins from a very early age. Consequently, the people are comparatively short and thin in this region and it was observed that the health of the people was poor.

Cereals are also eaten regularly by the people. There are only about 16% of the people who do not eat cereals at all (Appendix 17 Table 28). Nearly 70% of the people eat cereals either daily or once or twice a week. But they always have a secondary place in the diet and constitute only about 260 clories per person per day.[20]

Meat is eaten less frequently. Nearly 67% of the people eat it either once a month or on rare occasions such as weddings or other festivities. It is only about 24% who eat meat once or twice a week. Only about 3% of the people eat meat daily (Appendix 17 Table 29).

But milk and milk products are available very often to a great majority of people. Nearly 41% of the people drink milk daily while there are another about 42% who drink it once or twice a week. The proportion of people for whom milk is never available to drink is about 3% (Appendix 17 Table 32). The higher number of cows per head here (1.58 cows per person) maintains a constant supply of milk to the people. Similarly, milk products are available to about 75% of the people either daily or once or twice a week. It is about 4% of the people who never eat milk products.

In the availability of vegetables the region is much better than other regions. There are 75% of the people who eat vegetables here. The percentage of non-vegetable eating people is 25% which is much smaller than other regions. But despite the vegetables grown on several farms they are eaten daily by only 28% of the people (Appendix 17 Table 30).

Nearly 42% of the people eat eggs either daily or once or twice a week, even though chickens often destroy the ensete plants. The farmers keep an average 1.17 chicken per resident for eggs and meat. This is the region with highest number of chicken per head.

The least available constituents of food are fruits and fish (Appendix 17 Tables 31 and 36). More than 47% of the people do not eat fruits at all while the percentage of those who are lucky enough to eat fruits daily is only 9%. There is no one who eats fish daily or even once or twice a week, and fish is not eaten by about 84% of the people at all. The scarcity of fish is because of the small and mostly non-perennial rivers in the region.

10.4.5 Region 4 - Type 4a-6a (7c) Crop Rotation With Used Unimproved Grazing in Woodland Savanna

10.4.5.1 Introduction

This is a comparatively lower and drier region with woodland savanna vegetation as its distinguishing feature. Scattered shrubs and trees, particularly the acacia, grow with a variety of grasses of varying heights. This vegetation type is the most conspicuous and distinctive feature of this region. It extends into the Galla Lakes region northwards along the escarpment of the Shewan Plateau in a thin strip (Figure 7). To the east of the region lie the lowlands of the Awash in which live the pastoral and nomadic Adals. The eastern boundary of the region marks the termination of cropland in Shewa, particularly in the northern part. In the southern part, the region merges with the 4a-6a Type of the Arusi province. The total area under this Type is approximately 12,070 square kilometres, or 18.12% of the total Cropland in Shewa (Appendix 10 Table 2).

Most of the region lies below 1,800 metres; and the 1,000 metre contour marks the approximate limit of the region. In its southern section, in the Galla Lakes area, the slopes are gentle and the whole of the area gives an impression of an undulating plain with mountains on eastern and western sides. It is the part known as the 'neck' of the Rift Valley. A considerable part of the region is under the waters of the five Galla Lakes and Lake Galilie which has come into existence after the construction of Koka Dam on Awash river. The total area of lakes in this region is 1,292 square kilometres, or 1,51% of Shewa (See Appendix 2).

The region has numerous rivers passing through it.

The Awash and most of its tributaries originating on the Shewan Plateau pass through the region. In the southern relatively flat part some of them are used for irrigation by a few farmers. But almost all the rivers in the northern part are non-perennial streams which have severely eroded the eastern edge of the Shewan Plateau and are not used for irrigation. The prominent rivers of the region are the Awash, Meki, Mojo, Kesem, Kebena, Arsu etc. The Awash, Kesem and Robi are extensively used for irrigation on commercial farms which have been discussed under 10.2.

It is a hotter and drier region than the rest of the Shewan Plateau. The mean maximum temperatures are between 26°C and 32°C and the mean maximum 13°C and 16°C. The maximum temperature occurs in June and the minimum in January. In the rainy season temperatures are lower than the maximum for the year but always higher than the minimum for the year. The rainfall does not exceed 840 mm. anywhere and the eastern part has lower rain than the west.

The soils in the northern part are black and red volcanic soils. Some of the rivers have deposited their eroded material from the volcanic highlands of the Shewan Plateau just below the escarpment and have formed alluvial plains such as the Robi plain. In the southern part the lacustrine soils are found in the Galla Lakes area and most of these soils are under dense stands of acacia. Occasionally, the land has been cleared of acacia wood here for cultivation. But owing to the lack of water the soils are very little cultivated. However, the woodland savanna provides favourable conditions for grazing. As a result, large herds of cattle are kept by the inhabitants of this region. No other part of the Shewan Plateau has such large herds of cattle

as here. Sometimes these herds hinder the movement of road traffic. Cattle here are more important part of the economy of the people. Therefore the government has established the National Beef Cattle Breeding Centre near Adami Tulu to improve the quality of the cattle of this region.

But as will be seen later most of the farmers have few cattle and they cultivate land for subsistence food crops. On the comparatively higher altitude of the region cultivation is more important than keeping cattle, though the latter form an important and integral part of the rural economy.

Three all-weather roads pass through this region: Mojo-Shashemene road in the Galla Lakes area, Mojo-Awash town road in the Rift Valley and Debre Sina-Dese road in the northern section (Figure 7). In all, 73 farmers were interviewed along these roads.

10.4.5.2 Farm Type

Since most of this region lies below 1,800 metres more than 80% of the farms in the region fall into the category of lowland farms with their different crops and character. It is in Haikoch & Butajira awraja, particularly in Shashemene area, and in some parts of Yifat & Timuga awraja that altitude is comparatively higher, and most of the upland farms are located here. In Yerer & Kereyu awraja all the farms are lowland farms (Appendix 19 Table 1) as the altitude there decreases towards the floor of the Rift Valley. This is the highest percentage of lowland farms in all the regions.

10.4.5.3 Farm Size

Two important facts about the size of the holdings in the region can be seen from the figures of the farm size from Appendix 16 Table 2 and Appendix 18 Table 2. First, the region

INDEX

4 Reserved for Beef Cattle Breeding Centre
5 Cultivation in Woodland Savanna
6 Dense Acacia Woodlands
7 Open Acacia Woodlands
8 Grazing on Higher Land

INDEX

5 Traditionally Cultivated Land

6 Modern Cultivated Land (Robi Prison Farm)

7 Recently cleared Land for Farming

8 Grazing

9 Riparian Vegetation

has a high proportion of farms which are less than 0.50 gasha (20 hectares) in area. There are more than 42% of such farms. Second, the number of large farms of more than 4.00 gashas (160 hectares) at 22% is highest here. (Compare Region 1 with 9.09%, Region 2 with 3.16% and Region 3 with 10.53% of farms of this size. The figures indicate a high percentage of big landlords and a greater number of tenant farmers with small (under 20 hectares) farms, a position examined in more details later.

In Haykoch & Butajira and Yifat & Timuga awrajas the percentage of small farmers rises to nearly 63%. Among the farmers interviewed in Yerer & Kereyu awraja none have a holding of less than 0.50 gasha (20 hectares). Most have larger holdings and, in fact, more than 47% of them have very large holdings of more than 4.00 gashas (160 hectares). Yifat & Timuga has the second highest number of farmers with very large holdings. On the other hand, Yifat & Timuga awraja has the highest number of farmers with small holdings.

10.4.5.4 Ownership/Tenancy

Region 4 has a high percentage of tenant farmers ('chisegna') at 34.24%. It is only slightly lower than Region 2 which has the highest proportion of tenant farmers. But it should be noted that tenant farmers are also likely to be found on the farms of people with very large holdings. The large landowners have their land tilled by the tenant farmers. My method of sampling would not properly illustrate this situation.

More than 50% of the people are the owners of land ('gebbar') which is the highest number of such landowners in all the regions. The rest of the people own land on other systems.

All of them pay taxes to the government, except a small minority who work on church owned lands in which case they pay the taxs to the church.

10.4.5.5 Land Utilisation

Owing to the hot and dry climate and the shortage of water for irrigation farming is not the predominant economic activity in the region, and crop yields are very poor.

As a result, the proportion cultivated is smallest in Regmon 4 than elsewhere on the Shewan Plateau. The other important activity of the region is the cattle rearing. Large areas of grazing land are available in the region in the form of woodland savanna. Each herd needs a considerable area for grazing. Therefore a greater area of land is under grasslands than farming in the region. This is confirmed by the land use figures (Appendix 11) which show that nearly 50% of the land in this region is under grasslands, while cultivation is done only on about 33% of the land.

However, unlike the position in the Gurage area, farmers in the region have to cultivate comparatively large areas to subsist as the yield per gasha is small owing to the lack of water. New land is cleared of bush in many parts of the region every year to cultivate. But acacia trees are left standing in the fields, and land all around them is ploughed. The tukuls are located near each other and therefore the most distant fields can be quite far from the settlements. It is in this region that there are the highest number of persons per household (7.22 persons per household). The provision of a subsistence diet is the only activity in which people are engaged through out the year.

Pastoral activities, as has been seen, are much

Plate 9.1 Cultivation in savanna grasslands near Shashemene

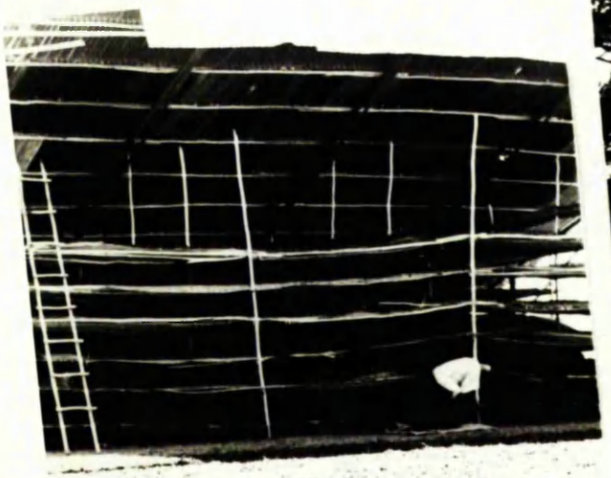
9.2 Cotton farming near Shashemene. The Chubi volcano rises in the background

9.3 'Berbere' pepper being dried to the north of Zwai

9.4 Cotton farming north of Robi

9 - 1

9 - 2



9 - 3

9 - 4

Plate 10.1 A water hole near Alaba

10.2 Collection of straw on a modern farm along the Addis Abeba-Weliso road

10.3 A cattle barn near Shashemene

10.4 Straw being taken to Addis Abeba by mules

10 - 1

10 - 2

10 - 3

10 - 4

more important here than in other regions. Therefore, as much as nearly 50% of the total farm area is devoted to grasslands. Such a high percentage of area under grasslands is next to only the Awash Valley where pastoralism is the way of life. Tall savanna grass grows here under the acacia woodlands. But it dries up after the rainy seasons and then the scarcity of grass becomes a problem.

The land use figures show that only 5% of land is left entirely for woodlands. Most of the demand for wood is met trees growing in the grasslands and also in the cultivated land. Heavy deforestation is going on in the region to supply wood and charcoal to the major towns, particularly Addis Abeba. Large areas which were under dense acacia woodlands about a decade ago are completely bare of trees today, not because of a heavy demand for new land for cultivation but because people get easy money by selling timber and charcoal. These products are sold all along the Mojo-Shashemene and Mojo-Nazret roads and brought by motorists and traders to Addis Abeba.

Unlike the Gurage-Kembata region vegetables are not grown here. Only 0.42% of land is under vegetables (Appendix 11), the lowest area under vegetables in all the regions. This is mainly because the region has little rain and the dry season is longer than Region 3. (The dry season in the Gurage-Kembata region lasts from October to February, while here it continues from October to April). In most of the rivers there is little or no water and therefore irrigation is not done.

Little fruit is grown on the farms for similar reasons. Only 1.10% of the area of total holdings is under fruit. In all 0.75% of the land is irrigated in the region and this is

mainly for fruit such as papayas.

However, this is potentially a very productive region, if sufficient water is made avaialble for irrigation. On government and privately owned farms where irrigation is carried out have demostrated that if irrigated the land gives a high yield of tropical crops, fruit and vegetables. It is in this region that large and modern farms such as the Wenji sugar estate (6843 hectares), Robi prison farm (1600 hectares) and the Leprisorium Experimentall Farm (520 hectares) near Shashemene could be developed. Similarly, several smaller, though still considerable, farms have come into existence in the past few years.

10.4.5.6 Crops

Under these dry and hot climatic conditions tropical crops like maize, sorghum, teff and wheat are grown in this region. It is predominantly a grain eating region and only about 10% of the people eat ensete here. Therefore, the production of grain crops is very important.

Maize is grown on more than 87% of farms (Appendix 17 Table 6) here. In Haykoch & Butajira awraja it is the most popular crop and it is grown on nearly 95% of farms. On the other hand, in Yifat & Timuga awraja it is grown on about 74% of farms.

Teff is cultivated on those farms ehich are generally above 1,700 metres. Since it is also the main food crop of the Amharas it is grown on a large number of farms in such areas. Overall 70% of the farms grow teff. It is grown mostly in Yerer & Kereyu and Yifat & Timuga awrajas while in Haykoch & Butajira awraja it is grown on about 59% of farms.

Wheat is grown on about 31% of farms, sorghum on

29%, beans on 34%, peas on 27% and chick peas on about 14% (Appendix 17 Tables 8-12). Ensete is grown on about 4% of farms. Coffee, cotton and 'berbere' pepper (Plate 9.3) are also grown. Coffee is grown in places which are near the ensete culture region while cotton is grown in those places where some irrigation is possible.

10.4.5.7 Crop Rotation

No specific system of crop rotation is used over a greater part of Region 4. The choice of crop for sowing is not made with the maintainance of the fertility of the soil in mind. The requirements of food for the family is always the main consideration. The same crop may be planted again and again in the same field. However, fallowing is done and the land is left for considerably longer than in other regions before the next crop is planted.

It is only in the higher parts of the region that a few people practise crop rotation to some extent. There maize may be followed by peas and beans which again may be followed by barley or teff.

10.4.5.8 Soil Conservation and Enrichment Practices

The low rainfall, gently undulating land over a greater part, and a better vegetation cover are factors indicating that soil erosion should not be important in the region. However, there are numerous rivers passing through the region, particularly in the northern part, and these have caused severe erosion. For instance, more than three quarters of the area between Mojo and Nazret has been made useless through gully erosion. The streams flowing down the escarpment of the Shewan Plateau erode much material every rainy season.

Few anti-erodion precautions have been adopted.

Afforestation, bunding and grassing are not done on more than 90% of the farms. Most of the farms on which these soil conservation practices are done belong to Yifat & Timuga awraja in the north.

But people use manures and grass burning as means of adding nutrients to the soils. Nearly 66% of the farmers use manures, while grass burning is used by about 24% (Appendix 17 Tables 20 and 21). Most of the manure comes in the form of droppings of the wandering cattle in the fields. The large herds graze in the grasslands as well as in the fields under fallow.

The highest number of farms which use manure is in Yerer & Kereyu awraja, with 100% of farms use manures. In Haykoch & Butajira awraja this percentage falls to about 62%, while in Yifat & Timuga awraja it is as low as about 37%. The reason for almost all farmers using manures in Yerer & Kereyu is that being near the cattle rearing people of the Awash Valley the farmers of this awraja also have large numbers of cattle. The droppings of these cattle provide higher amount of manure than in other awrajas.

Grass burning to add fertility to the soils is done more in Yifat & Timuga awraja than other awrajas of the region. In Yifat & Timuga more than 42% of the farmers practise grass burning. But in Yerer & Kereyu only about 6% use it as a means of adding fertility to the soils.

Chemical fertilisers are not used at all, except on the commercial farms.

10.4.5.9 Livestock

Owing to the availability of savanna grasslands and low percentage of cultivated land cattle rearing is equally an important occupation as crop production. The region has the

highest number of cattle per head. The figures show that there are 2.81 cows and 1.97 oxen per head here (Appendix 15). But it should also be noted that there are more than 30% of the people without any cow or ox here. The size of the herds of most of the people is below 50. The percentage of those who have more than 100 cattle being only about 5% (Appendix 16 Tables 11 and 13), nearly all of which are in Haykoch & Butajira and Yerer & Kereyu awrajas. Even the smaller herds are more in these awrajas than in Yifat & Timuga awraja.

The region also has the highest number of goats. There are 1.69 goats per head here, which is at least twide as great as elsewhere in highland Shewa. About 53% of the people have goats, the highest percentage of such people being in Yerer & Kereyu awraja (82.35%).

Appendix 17 Table 26 shows that despite being a region of savanna grasslands the grass is not sufficient here. Only 52% of the farms have a sufficient supply of grass (Appendix 17 Table 26). The reason is that soon after the rains the grass dries up. During the acute shortage of grass the stubble of maize and sorghum and straw is given to the cattle. But no fodder crops are grown.

The supply of water is comparatively good. It is sufficient on about 62% of farms. It is only in Yerer & Kereyu awraja that water is insufficient on a greater number of farms.

Nearly 78% of the cattle have been innoculated at least once here. But it is not much help without continuous care and veterinary supplies and the diseases among the cattle continue as before innoculation. The most prevalent diseases among the cattle

in the region are anthrax, rinderpest, blackleg, liverfluke etc.

10.4.5.10 Food Consumption Pattern

Cereals from main part of the diet of the people here as they are predominant among the crops grown in the region. There are a very few people who eat ensete here, most of them in the area just next to the ensete producing region. But they also eat cereals very regularly and the proportion of cereals in their diet is greater than ensete.

The figures show that 97.26% of the people of Region 4 eat cereals daily (Appendix 17 Table 28). The rest of the people did not reply and it is probable that they also eat cereals daily. Unlike Regions 1 and 2 everyone here eats cereals daily and there is no one who eats cereals only once or twice a week. This trend is found in all the awrajas included in Region 4.

Despite the large number of cattle here there are only 1.37% of people who eat meat daily and 24.66% who eat meat once or twice a week (Appendix 17 Table 29). The number of people eating meat so frequently is very small indeed when it is considered that there are twide as many cattle per head here than in other regions. It suggests that cattle being the important part of the economy are not killed for meat and the number of cattle is maintained. Also the larger the herd, whatever may be the quality of it, the higher will be the social status of the owner. As a result more than 52% of the people in this region eat meat only rarely. In Haykoch & Butajira, however, this proportion is still higher and there are more than 62% of the people who eat meat rarely.

Vegetables are not grown much here and therefore more than 42% of the people do not eat vegetables at all (Appendix

17 Table 30). However, there are 26% who eat vegetables daily. Another 19% approximately eat vegetables once or twice a week. But there is no one who eats vegetables daily in Yerer & Kereyu awraja and more than 52% of the people do not eat them at all. On the other hand, in Yifat & Timuga awraja there are only about 37% who do not eat vegetables at all. There are also great number of people who eat vegetables regularly and there are 37% who eat them daily which is the highest proportion of people eating vegetables so frequently in all the awrajas.

Fruit also is eaten more in Yifat & Timuga than any other awraja. But at the same time there are more than 47% who do not eat fruit at all there. In the Region 4 as a whole there are only about 7% who eat fruit daily and the percentage of those who eat fruit daily or never eat fruit is together 65.75% (Appendix 17 Table 31) which is the highest percentage of non-fruit eating people in all the regions.

Milk is more generally available in Region 4 than elsewhere and more than 41% of the people drink milk daily. Nearly 33% drink milk once or twice a week (Appendix 17 Table 32). It should be noted that the percentage of those who never drink milk is also highest in the region. There are nearly 7% who never drink milk, which is double that of any other region, with the proportion of people who never drink milk being highest in Yifat & Timuga with 21.05% (Appendix 19 Table 32). In addition, there is no one who drinks milk everyday. At the same time, however, the region also has the awraja with highest number of people drinking milk, and 65% of the respondents in Yerer & Kereyu drink milk daily and no one in this awraja never drinks milk.

But milk products are not consumed so frequently. There are only about 22% who eat milk products daily, while 45.21% of people eat them only once or twice a week (Appendix 17 Table 33). The percentage of those who never eat milk products is 5.48% which is the highest percentage of people never eating milk products.

More than 82% of the people never eat ensete here, while about 8% eat ensete daily, but as has been explained before it is eaten along with other cereals. About 4% eat it only once or twice a week. Most of the ensete eating people live in Haykoch & Butajira which is next to the predominantly ensete producing region of Gurage-Kembata plateau.

This is the only region where there are some people who eat fish daily, because there are many lakes in the region, particularly in the south. Haykoch & Butajira, in which lie the Galla Lakes and Lake Galilie, has the highest percentage of fish eating people at 11% (Appendix 19 Table 35). Fish from these lakes is brought to the roadside to be sold to motorists from Addis Abeba and other towns. A few traders also buy fish from these people on a comparatively large sdale for the urban centres. Fish is also eaten in Yifat & Timuga awraja where it is caught from the rivers.

Eggs are mostly eaten once or twice a week. With 42% of respondents consuming at this rate. But eggs are only eaten daily by 1.37%, which is the lowest percentage of all the regions. Nearly 22% eat eggs rearely.

10. 5 Improved Permanent Pastures (Managed or Enclosed) (Type 5)

This land use type includes those areas where controlled grazing is carried on in small enclosed fields where grass is being managed by manuring, reseeding, liming etc. The only

area om Shewa where controlled and enclosed grazing is done is the Beef Cattle Breeding Centre near Adami Tulu. But even here the natural grass is not improved by the application of fertilisers, or reseeded, and the area does not strictly fit into the definition of the World Land Use Survey.

10.6 Unimproved Grazing (Type 6)

Unimproved grazing is carried on in the areas of rather extreme climate which makes them unsuitable for cultivation of crops. In the 'dega' climate of the higher altitude and the 'kolla' climate of the lowlands, particularly in the Awash Valley, only grasslands are found. In the highlands the climate is too cold for the crops and in the lowlands it is too dry and hot. In both these areas grazing is done, though it is more important in the lowland areas of the Awash Valley where nomadic pastoralism is the way of life. This Type is therefore divided into two sections: 1. Used Unimproved Grazing in Highland Vegetation (6a-7b), 2. Used Unimproved Grazing in Woodland Savanna (6a-7c). (See Figure 7).

10.6.1 Used Unimproved Grazing in Highland Vegetation (6a-7b)

The climate of some of the highlands is too cold for many crops and most areas are under short grass. Cattle are brought to these higher elevations for grazing from the lower parts where settlements are located. The cattle, tended by the young boys, graze on the slopes. Such grazing is carried out over most of the mountain tops and slopes, most noticeable being Mts. Gurage, Wachacha, Yerer, Woti, Megezez and Abuye Meda. A daily movement of cattle takes place from the lower settlements to the high slopes and back.

10.6.2 Used Unimproved Grazing in Woodland Savanna (6a-7c)

This Type is very extensive in the Awash Valley

to the north of the Awash town (Figure 7). Most of the region is covered with acacia woodlands with an undergrowth of savanna grass. It is inhabited by the nomadic herdsmen of mostly Adal tribe (Figure 6) who were always dreaded by the highlanders. Several European expeditions through the area came to grief and the Adals are little known even today. Owing to the lack of roads and necessary funds the field-work was not possible in this area. It is estimated that this land use type extends over nearly 6,650 square kilometres, constituting 7.80% of the total area of Shewa (Appendix 10).

In general, the area is lower than 900 metres in altitude and it rises to the west to the foot hills of the Shewan Plateau. There are several rapids on this stretch of the Awash and the river flows through several big and small swampy lakes. It is believed that most of the region was covered by a big lake in an earlier pluvial period and the widespread lacustrine deposits are evidence of such a lake.

The climate is hot and dry. The daily maximum temperature at Metahara is 39°C and at Gewani 42°C; and the minimum temperature at these places is 7°C and 8°C respectively. However, temperatures vary with the season and also with local differences in altitude. The rainfall is about 850 mm. which comes mostly between July and September.

No cultivation is done by the nomadic pastoralists in the region who have been estimated to be about 8,000 in Shewa (Appendix 10). However, there is no estimate of the number of their cattle on which depends the existence of the people. Their monetary revenue comes mainly from the selling of hides, and pays for purchases of clothing and a few cereals.[21] Milk and milk products are consumed

by the shepherds and their families. Cattle are very seldom sold.

10.7 Woodlands (Type 7)

No exact data are available on the geographical and varietal distribution of the woodlands. According to W. I. Eichberger, there are 3,490 square kilometres of woodlands in Shewa (Appendix 10). There is nothing like forests reserves in Shewa but there are forests such as Jibat, Wofwasha, Menagesha etc. which are under the control and management of the Ethiopian government. In such forests concessions for cutting wood are often given. Sometimes people have been given small peices of land in lieu of salary or pension. Such land has been cleared of wood and one finds small clearings in the forests. The most dominant species in these forests are Olea Mussolini and Podocarpus gracilior.

Deforestation has been a feature for many years. In most of cases the villagers living near the forests consider them as their own and there are frequent conflicts between them the government wardens who have been appointed after the Imperial Proclamation of 1965. Meanwhile in some of the forests the villagers have been granted grazing rights. Thus there is a great confusion about the rights in the forests.

The area under forest is nearly 60 square kilometres, according to the Forestry Department of the Ministry of Agriculture. The rest of the area under woodlands mentioned above is in the form of isolated trees or clusters of trees in the cropland area. At higher altitudes the woodlands comprise montane savanna vegetation which have been discussed under 2.6 in the chapter of vegetation. The trees grown here are found mostly around the churches and villages. The more common of these are Acacia abyssinica, Hagenia abyssinica,

Pygeum africanum, and sometimes Juniperus procera. But the most striking stands are the eucalyptus plantations all over the higher plateau, though seldom these are of any great extent. Whereas the eucalyptus is symbolic of the uplands the acacia is the predominant species in the woodlands of lowlands. Over the lowlands, which are the more arid parts of the Shewan Plateau and the lowlands of the lowlands of the Awash Valley, dense acacia woodlands are found. Heavy deforestation is taking place in these woodlands, particularly in the Galla Lakes region, which has been mentioned earlier.

10.8 Swamps and Marshes (Type 8)

There are several swamps along the course of the Awash river, on the highland as well as in the Rift Valley. The Teji swamp, about 70 kilometres west of Addis Abeba along the Addis Abeba-Jima highway, is a water-logged area where the flood water of the Awash enters every rainy season. The area of the swamp recedes in the dry season when some of the land is brought under cultivation. When the water is at its maximum height the swamp extends over about 75 square kilometres.

The other swamps along the Awash are mostly to the north of Awash town. Of these Gewani swamp is the largest. It is estimated that the total area os swamps in Shewa is about 600 square kilometres (Appendix 10), which is about 0.70% of the total area of the province.

Besides, some swamp formations are found around the Galla Lakes, particularly around Lake Ziway.

10.9 Agriculturally Unproductive Land (Type 9)

Several volcanic cones and their bubble like features, the 'blisters', in the Awash Valley are unproductive, and some of

them have been scarcely colonised by vegetation. They are believed to have been formed by the escaping gases which were trapped under the hot lava. They are very rough and the land there is so barren that even grass does not grow. However, surprisingly a few scattered trees have managed to grow and survive, but these areas certainly cannot be used for grazing even, not to speak of cultivation. They are found in and around the hundreds of volcanic cones in the Awash Valley. It is not possible at the present to estimate the area under such land.

PART THREE: CONCLUSIONS

CONCLUSIONS

The primary and most striking feature which this study reveals is that there is a dearth of reliable information about the province, in particular about the climate, soils and population. Though data and descriptions of other aspects of the physical background are better they are also far from being satisfactory.

The mainstay of the economy of Shewa is agriculture. The livelihood of nearly all the peasants and their dependents is based directly on farming. In addition other families, living mostly in the urban areas, derive a greater portion of their income indirectly from the land. Upon the land, therefore, depend most of the 4,321,000 people of Shewa. More than 66,956 square kilometres of land, or 78.63% of the total area of the province, is under peasant and commercial farming (Appendix 10 Table 1). Cattle rearing is of secondary importance over most of the area. It should also be noted that fallow land is also used for grazing, and thus crop cultivation and cattle rearing are inseparable economic activities in Shewa.

Crop cultivation by peasants is done mainly over the Shewan Plateau and the southern section of the Rift Valley. This cropland area has four distinct regions, each one with its own individuality of physiography, climate and farming practices. Region 1 is peculiar in the deep river valleys and high ambas, while Region 4 is part of the Rift Valley with considerably lower altitude and different vegetation from the rest of the regions. Similarly, Region 3 is predominantly inhabited by the ensete eating

Gurage, Hadya and Kembata peoples, and though the physical features, climate and soils here are more or less the same as in the grain-producing Region 2, to its north and north-east, there is a marked difference in the food habits between the two regions. These differences have been caused by the different ethnic backgrounds of the people of Region 3 and other regions. Whereas the ensete eating people can find a constant supply of their food from small plots of land, the people of other regions have to bring more land under cultivation to subsist and have to invest more labour in their farms. So the land use pattern in Shewa is the result of physiographic and ethnological factors.

Among physiographic factors, which almost dictate the choice of crops to be sown in some areas, is the altitude. At higher altitudes temperatures are too low for most crops except barley. That is the reason why barley is predominantly grown in Selale, Tegulet and other awrajas which have a greater proportion of upland farms. But in Yerer & Kereyu awraja, which in general has lower elevation than all the other awrajas, barley is not grown at all (See Appendix 19 Table 1 for farm type and Table 2 for barley). Instead, maize and sorghum are mainly grown here. The altitude affects the temperature, which in return determines the choice of crop to be sown in a particular area. For this reason the traditional system of land classification according to the altitude came into existence.

The second factor which affects the growth of a few crops, for example coffee, is the rainfall. The rainfall in Shewa decreases from west to east. Accordingly the number of coffee growing farms also decreases eastwards. The coffee growing region

of Shewa is the south-west which receives first the rain bearing winds from the south-west. The rainfall figures in Appendix 7 show that most of the stations with nearly, or more than, 1,100 mm. are those which are located in the west or south-west, such as Chebo & Gurage, Kembata and Jibat & Mecha (Appendix 19 Table 12). Coffee is not grown in other awrajas.

The local variations in soils, degree of slope, irrigation etc. also have their effect on land use practices. For instance, reddish-brown and brown clays are generally preferred for the cultivation of ensete, while the dark clays are more suitable for teff and wheat. The steeper slopes in Menz and Merhabete in Region 1 are generally under grasslands and woodlands. But most of the land of the gently undulating plateau of Region 2 is generally under cultivation and very little land is left for grazing or woodlands. Wherever irrigation is possible the peasants try to bring the land under cultivation irrespective of the quality of soils and degree of slope. Of course, if the soils are absolutely infertile and the slope too steep to hold the water irrigation is not of much help.

But the factor which generally influences the land use pattern in south-western Shewa is ethnological. The physiography, climate and soils here are similar to the grain producing regions. As a matter of fact, grain crops are also grown in this region. But since ensete is the staple food of the people it is grown by almost every family around the tukuls. Extensive grasslands, which are found particularly in Gurage area, are possible because food supplies can be obtained from small plots of land. Also because the Gurage believe that all land beyond a particular limit fixed by the village is infertile. But the Amharas and Gallas

consider ensete as an inferior food and prefer grains. Consequently all the other regions except Region 3 cultivate larger area of land than Gurage-Kembata peoples and they can ill afford to leave as large areas of grasslands as in Region 3. The extensive woodland savanna grasslands in Region 4, however, are the product of lower altitude and comparatively hot and dry climate. But wherever man lives in this region he has cleared considerably more land for cultivation than in Region 3.

Despite the differences in the food habits all peasants cultivate land for mere subsistence. Generally nothing more than the immediate needs of the family is grown. Even coffee, in Region 3, is grown mainly for the needs of the family and little is taken to the weekly markets. In some parts vegetables and some grain crops are the other commodities for sale in the weekly markets. The commercial farms which have recently come into existence are managed in almost all cases by the urban dwellers. The peasants of Shewa neither have the knowledge nor the capital, and also in many cases do not have the will, to improve their farming methods. The fertile volcanic soils in most parts could give higher yields, the surplus from which could be sold in the national and international markets. But at the present most of the farmers are apparantly content with subsistence cultivation only. Some of the reasons responsible for this situation are outlined below.

The study reveals that nearly half of the farms are small in size (below 20 hectares). Several holdings included in this range are as small as 2 hectares, in all the regions. For many farmers it is difficult to produce sufficient to meet the food requirements of the family. Such farmers do not have

land to be devoted to any cash crop since all the land they have is under subsistence crops.

The figures of land tenure show that about 30% of the farmers have no land of their own and they generally work as 'chisegna', or tenant farmers, sharing the output of the land with the landowners. This system kills the incentive of the peasants to put more labour and capital in the land to increase production. Since a substential part of the product of the land is shared by the landowner, and there is no security of tenure it is discouraging to the tenant farmer. There is no attachment to the land and he generally has no will to produce more than his immediate needs. In Regions 2 and 4 the percentage of tenant farmers is much higher than the overall average of Shewa (in Region 2 it is 40.09% while in Region 4 it is 34.24%. See Appendix 17 Table 22). This percentage is likely to be higher than the figures show. The 'riste gult' generally have tenant farmers on their land. They pay taxes to the government as landowners and share the output of the land with the tenant farmers. Thus the percentage of the tenant farmers is higher than the landowners in Shewa.

The traditional system of farming and lack of irrigation are other factors contributing to the existence of subsistence farming. The yields are generally poor from this potentially fertile land. The mechanised and irrigated farms in several parts of the province have demonstrated what can be achieved from the land with modern methods of farming. But the peasants have no knowledge of these methods nor have they got the means such as the capital. The study reveals that almost all of them use no chemical fertilisers.

The other fact which emerges from the study is that, except in Region 4, nearly 60% of the total farm area is cultivated. In Region 4, which has the woodland sawanna vegetation, only about a third of the total farm area is cultivated, while nearly half (49.43%) is under grasslands. The largest proportion of cultivated area is found on the comparatively flat core of the Shewan Plateau in Region 2. The other noticeable fact in land utilisation on peasant farms is the greater proportion of land under vegetables in the Gurage-Kembata region (Region 3) at 7.28% (See Appendix 11).

The altitude generally determines the crops to be grown in a particular region. The higher parts of the plateau have a greater proportion of barley fields. In the lowlands, on the other hand, maize, chick peas, sorghum etc. are grown. The most widely eaten crops of Shewa, such as teff, wheat and ensete are grown mostly on the intermediate altitudes. Teff is the staple food crop os south-western Shewa, while cereals are eaten in the rest of Shewa. Even the nomadic Adals herdsmen buy a few cereals with the money earned from selling the hides.

It was found from the study that erosion is very active everywhere in Shewa, particularly in the north-west (Region 1) which has been deeply dissected by the numerous rivers. The deep river valleys and the remnants of the plateau, the ambas, in this region show the great menace of erosion. In other parts of the province gullies are formed everywhere in every rainy season because of the undulating nature of the plateau. The farmers are generally unaware of the dangers of the erosion to their land, and even

those who have the knowledge of it take little preventive measures.

Manures and grass burning are the most popular means of soil enrichment. Mostly the droppings of the wandering cattle serve as manure and there are few who collect the dung regularly. Manure pits are maintained, however, by most of the families in Region 3 to provide a constant supply of manures to the ensete plantations. In some parts, particularly in Tegulet, grass burning is practised by a greater proportion of people. They collect the burnt grass in small heaps to be scattered later in fields to be cultivated. Along with these, crop rotation is also practised in most parts of the province to maintain fertility of the soils. Generally the grain crops are followed by the leguminous crops. The land is left fallow for a few months to a year or two depending upon the size of the holding of the farmer and the amount of pressure on land for food.

Whereas crop cultivation is limited by various factors to the Shewan Plateau and the southern part of the Rift Valley, and at certain places along the Awash river, pastoralism is carried on in all parts of the province with varying degree. It forms an integral part of the crop economy over the plateau while in the Awash Valley nomadic pastoralism is the way of life. Cattle are wealth in the highlands and lowlands alike, though their importance is greater in the latter because they are the only means of livelihood here. In the highlands some cattle, particularly the oxen, are important for farming, though in the hoe culture region of the Gurage-Kembata peoples they are kept for other purposes. The size of the herd kept by a person determines his social status, whether it be in the highlands or lowlands. The

study shows that on the sampled farms there are 0.66 sheep, 0.91 goats, 1.62 cows, 1.01 oxen and 0.88 chicken per head on an average (Appendix 15). Unfortunately the number of cattle in the Awash Valley is not known. However, the quality of the cattle is poor everywhere and there are several diseases prevalent among them. The veterinary care is very unsatisfactory, though the study reveals that cattle over most of the farms were innoculated at least once.

GLOSSARY OF ETHIOPIAN WORDS USED AND REFERENCES

GLOSSARY OF ETHIOPIAN WORDS USED IN THE TEXT

Amba	-	the flat-topped, steep-sided remnant of the plateau in Menz and Merhabete
Awraja	-	the largest administrative sub-division of the Governate-General
Berbere	-	Capsicum frutescens
Chat	-	Catha edulis, chewed as a narcotic
Chisegna	-	tenant farmer
Dat	-	Juniperous procera , a common tree
Dega	-	cold mountains in altitudes above 2,400 - 2,600 metres
Gasha	-	a unit of land of 40 hectares or 400,000 square metres. It varies, however, from place to place in Ethiopia.
Gebbar	-	landowner
Gesho	-	Rhamnus prinoides, used for flavouring the local beer
Injera	-	the local bread made from teff
Kocho	-	the fluffy substance made from the stem of ensete
Ensete	-	the banana-like plant Ensete edulis, the stem of which is used as food
Kolla	-	hot lowlands upto 1,800 metres altitude
Maderia	-	land granted to a person in lieu of salary or pension
Rist gult	-	land given to the owner by the state as rewards for his services.

Teff	-	Eragrostis abyssinica, the most important grain crop for food
Tella	-	the local beer made generally from barley
Tukul	-	the round thatched-roofed hut
Wirch	-	mountain tops with 'alpine' climate
Woina Dega	-	Temperate highlands in altitudes from 1,400 - 1,800 to 2,400 - 2,600 metres

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APPENDICES AND TABLES

Appendix 1: Total Length of Rivers in Shewa

	River	Length in Kilometres
1.	Omo (Gibe)	258
2.	Kaliti	128
3.	Awash	526
4.	Guder	144
5.	Muger	156
6.	Jema	206
7.	Wachit	138
8.	Kesem	148
9.	Abay	105

Source: Planimeteric Measurement on Figure 4, C. P. Singh, 1970.

Appendix 2: Total Area of Lakes in Shewa

	Lake	Kms.^{2}	% of Total Area of Lakes in Shewa	% of Total Area of Lakes in Ethiopia
1.	Abyata'	205	15.87	2.92
2.	Awasa*	40	3.10	0.57
3.	Galilie '	250	19.35	3.56
4.	Langano*	100	7.74	1.42
5.	Shala '	409	31.66	5.82
6.	Ziway*	288	22.28	4.10
	Total	1,292	100.00	18.39

Source: ' Statistical Abstract 1967 & 1968, Addis Abeba, pp. 11.

* Planimetric Measurement on Figure 3, C. P. Singh, 1970.

Appendix 3: Mean Monthly Temperature (oC) At Selected Stations

	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period of Records
1.	Addis Abeba	15.8	16.9	18.1	17.7	18.1	16.6	15.3	15.2	15.6	15.8	15.3	15.3	16.3	1946-59
2.	Agere Hiywot	18.5	19.5	20.0	20.0	19.4	17.6	16.6	16.7	17.1	17.8	18.1	18.1	18.3	1954-58
3.	Akaki	17.5	19.6	20.7	20.2	20.5	18.9	17.5	17.9	18.3	18.4	17.9	18.2	18.8	1951-56
4.	Debre Zeit	17.7	18.7	19.7	20.8	21.0	19.6	17.6	18.4	18.2	17.5	16.7	17.3	18.6	1953-59
5.	Wenji	18.6	19.8	22.7	22.9	23.5	23.2	21.0	20.9	21.2	19.5	18.4	18.6	20.9	1953-59

Source: National Climatological Service, Civil Aviation Administration, Ministry of Communications, Addis Abeba

Appendix 4: Mean Maximum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period of Records
1. Addis Abeba	23.7	24.6	25.3	24.3	25.3	23.2	20.1	19.9	21.0	22.3	22.9	22.3	22.9	1951-65
2. Agere Hiywot	26.4	27.5	27.3	26.9	26.8	23.9	21.4	21.4	23.0	25.0	25.2	25.7	25.0	1954-59
3. Akaki	29.0	29.7	30.1	28.6	29.7	26.6	23.1	23.6	25.3	27.5	28.9	29.0	27.6	1951-57
4. Awash	31.0	31.9	33.1	33.5	36.3	36.5	33.0	31.7	33.1	33.2	31.9	30.4	-	1953-62 & 1965-67
5. Debre Zeit	25.7	26.8	27.3	28.2	29.5	26.9	23.0	24.3	24.2	24.1	24.9	25.5	25.9	1953-59
6. Giyon	27.1	27.4	26.8	27.0	27.4	23.9	21.1	21.3	23.0	24.5	24.7	25.7	-	1953-59
7. Hosaina	27.0	29.7	29.2	27.3	27.5	25.4	23.7	21.8	25.1	26.1	28.5	28.7	-	1953-59
8. Nazret	26.9	29.7	29.5	32.1	30.2	28.7	24.9	24.9	30.1	29.5	25.1	20.3	-	1953-59
9. Silti	26.3	26.6	27.5	26.7	27.4	26.0	22.6	22.6	25.2	24.9	26.4	26.1	-	1954-59
10. Wenji	25.9	27.3	30.1	29.8	31.1	29.5	25.8	25.6	26.8	27.2	26.3	25.8	27.6	1953-59

Source: As Appendix 3.

Appendix 5: Mean Minimum Temperature (°C)

	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annaul	Period of Records
1.	Addis Abeba	6.7	7.6	9.8	10.3	10.5	9.7	10.0	10.0	9.5	7.3	6.6	6.6	8.6	1951-65
2.	Agere Hiywot	10.5	11.5	12.7	13.0	12.0	11.3	11.9	11.9	11.3	10.8	10.3	10.4	11.5	1953-59
3.	Akaki	5.8	9.4	11.3	11.8	11.3	11.1	11.9	12.2	11.2	9.3	6.8	7.3	10.0	1951-56
4.	Awash	11.1	15.0	16.3	17.9	18.9	20.2	18.4	17.8	17.4	15.5	14.1	13.3	-	1953-61 & 1965-67
5.	Debre Zeit	9.5	10.6	12.6	13.4	12.6	11.8	12.4	13.2	11.9	10.3	8.8	8.8	11.3	1953-59
6.	Giyon	10.6	11.9	12.1	12.7	11.4	11.5	11.6	11.0	10.8	10.9	10.8	10.9	-	1953-59
7.	Hosaina	6.9	7.0	9.2	10.2	8.6	8.9	9.2	9.2	8.4	7.8	6.3	6.2	-	1053-59
8.	Nazret	13.6	15.4	15.8	15.3	14.6	16.6	15.2	15.5	15.9	12.9	15.4	7.6	-	1953-59
9.	Silti	7.0	8.3	9.4	11.3	10.2	9.1	9.4	9.9	9.9	9.1	7.6	6.9	9.4	1954-59
10.	Wenji	11.3	12.3	15.0	16.1	15.4	17.0	16.2	16.1	15.6	11.6	10.3	11.4	14.0	1953-59

Source: As Appendix 3.

Appendix 6: Diurnal Range of Temperature (°C) At Selected Stations

	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period of Records
1.	Addis Abeba	17.0	17.0	15.5	14.0	14.8	13.5	10.1	9.9	11.5	15.0	16.3	15.7	-	1951-65
2.	Agere Hiywot	15.9	16.0	14.6	12.1	14.8	12.6	9.5	9.5	11.7	14.2	14.9	15.3	-	1953-59
3.	Awash	20.1	18.9	16.8	15.6	17.4	16.3	14.6	13.5	13.7	17.7	17.8	17.1	-	1951-56
4.	Debre Zeit	16.2	16.2	14.7	14.8	16.9	15.1	10.6	11.1	12.3	13.8	16.1	16.7	-	1953-56 & 1965-67
5.	Giyon	16.5	15.5	14.7	14.3	16.0	12.4	9.5	10.3	12.2	13.6	13.9	14.8	-	1953-59
6.	Hosaina	20.1	22.7	20.0	17.1	18.9	16.5	14.5	12.6	16.7	18.3	22.2	22.5	-	1953-59
7.	Koka	19.6	17.8	18.2	17.6	17.7	16.5	13.0	12.6	14.1	16.8	17.8	17.1	-	1953-59
8.	Nazret	13.3	14.3	13.7	16.8	15.6	12.1	9.7	9.4	14.2	16.6	9.7	12.7	-	1953-59
9.	Silti	19.3	18.3	18.1	15.4	17.2	16.9	13.2	12.7	15.3	15.8	18.8	19.2	-	1954-59
10.	Wenji	14.6	15.1	13.7	15.7	12.5	9.6	9.5	11.2	15.6	16.0	14.4	13.6	-	1953-59

Source: Computed From Appendices 4 and 5.

Appendix 7: Average Monthly Rainfall (mm.)

	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.	Debre Sina	76.7	45.7	129.2	215.2	111.2	79.4	387.2	216.6	86.4	79.2	28.7	70.4	1525.9
2.	Welkite	21.4	10.7	86.8	118.3	95.6	237.5	314.0	301.1	164.7	63. 7	15.3	3.8	1432.9
3.	Fiche	13.4	17.0	73.4	66.4	38.7	89.7	487.6	412.9	144.5	40.6	5.8	7.9	1397.9
4.	Shashemene	27.3	61.1	108.8	129.6	155.7	120.9	187.1	181.7	153.4	81.3	45.6	14.6	1276.6
5.	Baco	10.5	25.1	47.9	70.0	140.9	185.8	270.1	212.5	158.3	59.7	50.3	17.8	1248.5
6.	Giyon	15.3	22.1	63.0	66.1	42.8	200.7	281.4	344.3	161.9	64.0	2.2	2.5	1245.0
7.	Hosaina	35.1	11.9	88.8	150.3	99.3	158.4	153.0	201.3	172.4	67.6	9.6	20.5	1168.2
8.	Addis Abeba	18.7	21.9	71.5	98.6	61.1	114.6	265.5	238.8	180.6	42.4	6.3	14.5	1164.9
9.	Agere Hiywot	25.7	21.0	86.2	71.7	59.1	156.1	251.4	233.9	116.0	54.9	5.5	15.8	1088.2
10.	Chacha	19.0	24.4	47.4	27.2	30.6	67.2	351.2	340.2	99.2	32.7	16.1	4.8	1064.7
11.	Silti	50.3	47.2	115.4	99.0	54.5	105.3	146.1	174.0	167.7	58.8	5.7	19.9	1043.3
12.	Koka	15.5	26.1	59.0	64.2	42.1	50.6	214.5	212.3	111.0	15.9	10.0	7.7	839.7
13.	Wenji	9.2	22.0	47.4	75.6	31.9	70.2	206.5	193.6	93.4	37.9	1.1	10.2	799.0
14.	Nazret	7.2	14.5	20.3	61.8	42.9	92.2	177.6	226.0	112.0	19.1	4.7	8.4	785.7
15.	Awash	15.0	34,3	47.2	37.9	21.8	41.1	124.2	163.3	58.1	14.8	15.7	6.8	580.2

Source: As Appendix 3.

Appendix 8: Total Population of Shewa

	Male	Female	Total
1. Rural Areas	1,847,000	1,738,000	3,585,000
2. Addis Abeba	287,000	273,000	560,000
3. Surveyed Towns	42,000	48,000	90,000
4. Semi-Nomadic Areas	4,000	4,000	8,000
Total	2,216,000	2,105,000	4,321,000

Source: Central Statistical Office, Addis Abeba, Report On A Survey Of Shoa Province, 1966.

Appendix 9: Population of Shewa by Sex and Age Group

Age Group	Males	%	Females	%	Total	%
00 - 04	323,900	17.5	282,300	16.2	606,200	17.0
05 - 09	294,600	16.0	263,300	15.2	557,900	15.5
10 - 14	226,900	12.3	175,800	10.1	402,700	11.2
15 - 19	153,000	8.3	129,800	7.5	282,800	7.9
20 - 24	122,000	6.6	160,800	9.2	282,800	7.9
25 - 29	125,000	6.8	150,700	8.7	275,700	7.7
30 - 34	136,500	7.4	168,500	9.7	305,000	8.5
35 - 39	91,000	4.9	92,600	5.3	183,600	5.1
40 - 44	95,400	5.2	108,500	6.2	203,900	5.7
45 - 49	61,000	3.3	47,600	2.7	108,600	3.0
50 - 54	69,100	3.7	65,700	4.0	134,800	3.8
55 - 59	41,800	2.3	21,300	1.2	63,100	1.7
60 - 64	39,600	2.1	31,700	1.8	71,300	2.0
65 And Over	67,200	3.6	39,400	2.2	106,600	3.0
Total	1,847,000	100.0	1,738,000	100.0	3,585,000	100.0

Source: As Appendix 8.

Appendix 10

Table 1: LAND USE IN SHEWA

(As Shown On Figure 7)

	Land Use Types*	Area in Km^2	% of Total Area of Shewa
1.	Urban Settlements	310	0.36
2.	Horticulture	4	0.004
3.	Cropland With Grazing on Plateau	66,643	78.27
4.	Commercial Farming[1]	313	0.36
5.	Used Unimproved Grazing in Woodland Savanna	6,648	7.80
6.	Forests[2]	3,490	4.09
7.	National Parks And Game Reserves[3]	5,500	6.45
8.	Water - Lakes[4]	1,292	1.51
9.	Marshy Land	600	0.70
10.	Mountain Tops Unsuitable For Farming	400	0.46
	Total	85,200	100.00

* All figures, other than those for which sources are given, have been computed by the author.

1 Figures from the Ethiopian Government, Awash Valley Authority.

2 From Food Production and Consumption in Ethiopia, by W.G.Eichberger, unpublished report.

3 Statistical Abstract 1967 & 1968, Addis Abeba, pp. 12.

4 See Appendix 2.

Appendix 10

Table 2: DISTRIBUTION OF CROPLAND IN SHEWA BY REGION (As Shown On Figure 7)

Region	Land Use Type	Area in Km^2	% of Total Cropland
1	Crop Rotation On Terraced Land With Used Unimproved Grazing	12,652	18.98
2	Crop Rotation With Used Unimproved Grazing	25,008	37.52
3	Crop Rotation And Ensete Plantations With Used Unimproved Grazing	16,912	25.38
4	Crop Rotation With Used Unimproved Grazing In Woodland Savanna	12,071	18.12
Total		66,643	100.00

Source: Planimetric Measurement on Figure 7, C. P. Singh, 1970

Appendix 11: LAND UTILISATION OF SAMPLED FARMS (BY REGION) - 255 Farms

In Gasha And Percent

(One Gasha = 40 Hectares)

Region	Total Farm Area		Area Cultivated		Area Under Vegetables		Area Under Fruit		Area Under Grasslands		Area Under Woodlands		Area Irrigated	% of Total Farm Area
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	
1	11.61	2.90	6.52	56.16	0.45	3.88	0.35	3.01	2.64	22.74	0.95	8.18	0.40	3.45
2	89.94	22.50	69.41	77.17	0.47	0.52	0.05	0.06	10.95	12.17	5.96	6.63	2.01	2.23
3	57.83	14.47	35.56	61.49	4.21	7.28	1.28	2.21	9.87	17.07	4.50	7.78	0.75	1.30
4	240.39	60.13	79.01	32.86	1.01	0.42	2.64	1.10	118.82	49.43	11.97	4.98	1.81	0.75
Total	399.77	100.00	190.50	47.65	6.14	1.54	4.32	1.08	142.28	35.59	23.38	5.85	4.97	1.24

Source: Questionnaire Survey, C. P. Singh, 1969

Appendix 12: LAND UTILISATION OF SAMPLED FARMS (BY AWRAJA) - 255 Farms

In Gasha And Percent

(One Gasha = 40 hectares)

Awraja	Total Farm Area		Area Cultivated		Area Under Vegetables		Area Under Fruit		Area Under Grasslands		Area Under Woodlands		Fallow Land	
	Area	%*	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1 & 2**	8.45	2.1	4.05	47.9	0.75	8.9	0.35	4.1	2.20	26.0	0.85	10.1	0.25	3.0
3	68.07	17.0	37.07	54.4	0.31	0.5	2.34	3.4	3.00	4.4	2.00	2.9	23.35	34.4
4	40.15	10.0	28.68	71.4	0.18	0.4	0.17	0.4	6.05	15.1	3.57	8.9	1.50	3.8
5	20.62	5.2	18.37	89.1	0.00	0.0	0.00	0.0	1.38	6.7	0.72	3.5	0.15	0.7
6	36.13	9.1	27.37	75.7	0.65	1.8	0.50	1.4	4.55	12.6	2.82	7.8	0.24	0.7
7	28.10	7.0	19.91	67.3	0.22	0.8	0.05	0.2	3.46	12.3	3.16	11.2	2.30	8.2
8	7.10	1.8	4.75	66.9	0.00	0.0	0.00	0.0	1.44	20.3	0.32	4.5	0.59	8.3
9	151.62	37.9	27.09	17.9	0.53	0.3	0.13	0.1	113.52	74.9	7.45	4.9	2.90	1.9
10	35.23	8.8	21.08	59.8	3.03	8.6	0.60	1.7	6.38	18.1	2.49	7.1	1.65	4.7
11	4.30	1.1	3.13	72.8	0.47	10.9	0.18	4.2	0.30	7.0	0.00	0.0	0.22	5.1
Total	399.77	100.00	190.50	47.6	6.14	1.6	4.32	1.1	142.28	35.6	23.38	5.8	33.15	8.3

* Percentage is shown in terms of total farm area.
** For awraja code see Figure 8.

Source: Questionnaire Survey, C. P. Singh, 1969.

Appendix 13: TOTAL MEMBERS OF HOUSEHOLD OF SAMPLED FARMS (BY REGION) - 255 Farms

Region	Persons No.	Persons %	Average No. of Persons Per Household
1	65	3.95	5.91
2	573	34.90	6.16
3	477	29.05	6.12
4	527	32.10	7.22
Total	1,642	100.00	6.44

Source: Questionnaire Survey, C. P. Singh, 1969

Appendix 14: TOTAL MEMBERS OF HOUSEHOLD OF SAMPLED FARMS (BY AWRAJA) - 255 Farms

Awraja	Persons No.	Persons %	Average No. of Persons Per Household
1 & 2*	34	2.1	8.50
3	135	8.2	7.11
4	142	8.6	5.26
5	170	10.3	8.50
6	242	14.7	13.68
7	153	9.3	5.28
8	106	6.5	6.24
9	267	16.3	7.22
10	328	20.0	5.56
11	65	4.0	5.42
Total	1,642	100.0	6.44

* For awraja code see Figure 8.

Source: Questionnaire Survey, C. P. Singh, 1969.

Appendix 15: CATTLE PER HEAD OF SAMPLED FARMS (BY REGION) - 255 Farms

Region	Sheep		Goats		Cows		Oxen		Chicken	
	No.	P.Head	No.	P.Head	No.	P.Head	No.	P.Head	No.	P.Head
1	43	0.66	44	0.68	70	1.08	26	0.40	50	0.77
2	557	0.97	234	0.41	351	0.61	231	0.40	388	0.68
3	185	0.39	335	0.70	753	1.58	362	0.76	560	1.17
4	299	0.57	889	1.69	1480	2.81	1036	1.97	444	0.84
Total	1,084	0.66	1,502	0.91	2,654	1.82	1,655	1.01	1,442	0.88

Source: Questionnaire Survey, C. P. Singh, 1969.

Appendix 16

TABLE 1: TOTAL MEMBERS OF HOUSEHOLD BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		6.00	15.00	24.00
REGION 1	4	6	1	0
REGION 2	48	42	5	0
REGION 3	41	33	2	0
REGION 4	32	39	1	1

PERCENTAGE DISTRIBUTION

		6.00	15.00	24.00
REGION 1	36.36	54.55	9.09	0.0
REGION 2	50.53	44.21	5.26	0.0
REGION 3	53.95	43.42	2.63	0.0
REGION 4	43.84	53.42	1.37	1.37

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 2: TOTAL FARM AREA GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.50	2.25	4.00
REGION 1	6	4	0	1
REGION 2	25	60	7	3
REGION 3	33	29	6	8
REGION 4	31	19	7	16

PERCENTAGE DISTRIBUTION

		0.50	2.25	4.00
REGION 1	54.55	36.36	0.0	9.09
REGION 2	26.32	63.16	7.37	3.16
REGION 3	43.42	38.16	7.89	10.53
REGION 4	42.47	26.03	9.59	21.92

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 3: CULTIVATED AREA GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.50	2.25	4.00
REGION 1	6	4	1	0
REGION 2	34	55	5	1
REGION 3	49	15	9	3
REGION 4	35	21	6	11

PERCENTAGE DISTRIBUTION

		0.50	2.25	4.00
REGION 1	54.55	36.36	9.09	0.0
REGION 2	35.79	57.89	5.26	1.05
REGION 3	64.47	19.74	11.84	3.95
REGION 4	47.95	28.77	8.22	15.07

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 4: AREA UNDER VEGETABLES GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	0.10	0.20
REGION 1	9	1	0	1
REGION 2	90	4	1	0
REGION 3	43	23	4	6
REGION 4	60	5	2	2

PERCENTAGE DISTRIBUTION

		0.01	0.10	0.20
REGION 1	81.82	9.09	0.0	9.09
REGION 2	94.74	4.21	1.05	0.0
REGION 3	56.58	30.26	5.26	7.89
REGION 4	82.19	12.33	2.74	2.74

Source: Questionnaire Survey, C.P. Singh, 1969

Appendix 16

TABLE 5: AREA UNDER FRUITS GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50
REGION 1	9	2	0	0
REGION 2	94	1	0	0
REGION 3	67	8	0	1
REGION 4	66	6	0	1

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50
REGION 1	81.82	18.18	0.0	0.0
REGION 2	98.95	1.05	0.0	0.0
REGION 3	88.16	10.53	0.0	1.32
REGION 4	90.41	8.22	0.0	1.37

Source: Questionnaire Survey, C.P. Singh, 1969

Appendix 16

TABLE 6: AREA UNDER GRASSLANDS GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50
REGION 1	7	2	0	2
REGION 2	55	31	4	5
REGION 3	41	29	1	5
REGION 4	36	26	1	10

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50
REGION 1	63.64	18.18	0.0	18.18
REGION 2	57.89	32.63	4.21	5.26
REGION 3	53.95	38.16	1.32	6.58
REGION 4	49.32	35.62	1.37	13.70

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 7: AREA UNDER WOODLANDS GASHA BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBLTICN

		0.01	0.25	0.50
REGION 1	8	2	0	1
REGION 2	71	20	0	4
REGION 3	57	14	1	4
REGION 4	49	16	0	8

PERCENTAGE DISTRIBLTICN

		0.01	C.25	0.50
REGION 1	72.73	18.18	0.0	9.09
REGION 2	74.74	21.05	0.C	4.21
REGION 3	75.00	18.42	1.32	5.26
REGION 4	67.12	21.92	0.C	10.96

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 8: AREA IRRIGATED BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50
REGION 1	8	3	0	0
REGION 2	87	8	0	0
REGION 3	71	5	0	0
REGION 4	68	1	1	3

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50
REGION 1	72.73	27.27	0.0	0.0
REGION 2	91.58	8.42	0.0	0.0
REGION 3	93.42	6.58	0.0	0.0
REGION 4	93.15	1.37	1.37	4.11

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 9: SHEEP BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00
REGION 1	8	3	0	0
REGION 2	38	57	0	0
REGION 3	50	26	0	0
REGION 4	44	28	1	0

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00
REGION 1	72.73	27.27	0.0	0.0
REGION 2	40.00	60.00	0.0	0.0
REGION 3	65.79	34.21	0.0	0.0
REGION 4	60.27	38.36	1.37	0.0

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 10: GOATS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00
REGION 1	6	5	0	0
REGION 2	67	28	0	0
REGION 3	34	42	0	0
REGION 4	34	37	0	2

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00
REGION 1	54.55	45.45	0.0	0.0
REGION 2	70.53	29.47	0.0	0.0
REGION 3	44.74	55.26	0.0	0.0
REGION 4	46.58	50.68	0.0	2.74

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 11: CCWS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00
REGION 1	4	7	0	0
REGION 2	19	75	1	0
REGION 3	14	61	0	1
REGION 4	23	46	1	3

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00
REGION 1	36.36	63.64	0.0	0.0
REGION 2	20.00	78.95	1.05	0.0
REGION 3	18.42	80.26	0.0	1.32
REGION 4	31.51	63.01	1.37	4.11

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 12: CHICKEN BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

		0.01	10.00	20.00
REGION 1	5	4	1	1
REGION 2	33	49	7	6
REGION 3	29	37	5	5
REGION 4	31	30	7	5

PERCENTAGE DISTRIBUTION

		0.01	10.00	20.00
REGION 1	45.45	36.36	9.09	9.09
REGION 2	34.74	51.58	7.37	6.32
REGION 3	38.16	48.68	6.58	6.58
REGION 4	42.47	41.10	9.59	6.85

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 16

TABLE 13: OXEN BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0.01	10.00	20.00
REGION 1	4	7	0	0
REGION 2	19	75	1	0
REGION 3	22	49	1	4
REGION 4	22	47	2	2

PERCENTAGE DISTRIBUTION

		0.01	10.00	20.00
REGION 1	36.36	63.64	0.0	0.0
REGION 2	20.00	78.95	1.05	0.0
REGION 3	29.95	64.47	1.32	5.26
REGION 4	30.14	64.38	2.74	2.74

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 1: FARM TYPE BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	6	5	0	0	0	0	0	0	0
REGION 2	5	87	3	0	0	0	0	0	0	0
REGION 3	0	65	11	0	0	0	0	0	0	0
REGION 4	0	14	59	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	54.55	45.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	5.26	91.58	3.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	85.53	14.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	19.18	80.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 Upland Farms
2 Lowland Farms
0 No Reply

Source: Questionnaire Survey, G.P.Singh, 1969.

Appendix 17

TABLE 2: EDUCATIONAL LEVEL BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	10	0	0	0	1	0	0	0	0
REGION 2	0	84	9	2	0	0	0	0	0	0
REGION 3	0	62	10	2	0	2	0	0	0	0
REGION 4	3	61	8	1	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	90.91	0.0	0.0	0.0	9.09	0.0	0.0	0.0	0.0
REGION 2	0.0	88.42	9.47	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	81.58	13.16	2.63	0.0	2.63	0.0	0.0	0.0	0.0
REGION 4	4.11	83.56	10.96	1.37	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Illiterate
2 Read and Write
3 Grade 2-4
4 Grade 4-9
5 Over 9th Grade

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 3: OCCUPATION BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5	6	7	8	
REGION 1	0	0	11	0	0	0	0	0	0	0
REGION 2	0	0	92	0	0	0	2	0	1	0
REGION 3	0	0	72	0	0	0	0	0	4	0
REGION 4	1	0	63	0	0	1	1	2	5	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	0.0	0.0	95.84	0.0	0.0	0.0	2.11	0.0	1.05	0.0
REGION 3	0.0	0.0	94.74	0.0	0.0	0.0	0.0	0.0	5.26	0.0
REGION 4	1.37	0.0	86.30	0.0	0.0	1.37	1.37	2.74	6.85	0.0

0 No Reply
1 None
2 Farming
5 Farming and Trading
6 Priest and Farmer
7 Government Servant
8 Other

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 4: BARLEY BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	7	4	0	0	0	0	0	0	0
REGION 2	0	62	33	0	0	0	0	0	0	0
REGION 3	0	26	51	0	0	0	0	0	0	0
REGION 4	0	28	45	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	63.64	36.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	0.0	65.26	34.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	32.89	67.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	38.36	61.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Grown
2 Not Grown

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 5: WHEAT BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	5	6	0	0	0	0	0	0	0
REGION 2	0	77	18	0	0	0	0	0	0	0
REGION 3	0	32	44	0	0	0	0	0	0	0
REGION 4	0	23	50	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	45.45	54.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	0.0	81.05	18.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	42.11	57.89	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	31.51	68.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Grown
2 Not Grown

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 6: MAIZE BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	1	2	8	0	0	0	0	0	0	0
REGION 2	1	12	82	0	0	0	0	0	0	0
REGION 3	0	46	31	0	0	0	0	0	0	0
REGION 4	0	54	9	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	9.09	18.18	72.73	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	12.63	86.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	59.21	40.79	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	87.67	12.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms with Maize
2 Farms without Maize

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 7: TEFF BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	7	4	0	0	0	0	0	0	0
REGION 2	1	62	32	0	0	0	0	0	0	0
REGION 3	0	50	26	0	0	0	0	0	0	0
REGION 4	0	51	22	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	63.64	36.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	65.26	33.68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	65.79	34.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	69.86	30.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Teff
2 Farm Without Teff

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 8: SORGHUM BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	4	7	0	0	0	0	0	0	0
REGION 2	1	7	87	0	0	0	0	0	0	0
REGION 3	0	16	60	0	0	0	0	0	0	0
REGION 4	0	21	52	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	36.36	63.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	7.37	91.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	21.05	78.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	28.77	71.23	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Sorghum
2 Farms Without Sorghum

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 9: BEAN BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5	6	7	8	9
REGION 1	0	7	4	0	0	0	0	0	0	0
REGION 2	0	58	37	0	0	0	0	0	0	0
REGION 3	0	23	53	0	0	0	0	0	0	0
REGION 4	0	25	48	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5	6	7	8	9
REGION 1	0.0	63.64	36.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	0.0	61.05	38.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	30.26	69.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	34.25	65.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Bean
2 Farms Without Bean

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 10: CHICK PEAS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	1	10	0	0	0	0	0	0	0
REGION 2	1	45	49	0	0	0	0	0	0	0
REGION 3	1	23	52	0	0	0	0	0	0	0
REGION 4	0	10	63	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	9.09	90.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	47.37	51.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	1.32	30.26	68.42	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	13.70	86.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Chick Peas
2 Farms Without Chick Peas

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 11: PEAS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	6	5	0	0	0	0	0	0	0
REGION 2	1	36	58	0	0	0	0	0	0	0
REGION 3	0	22	54	0	0	0	0	0	0	0
REGION 4	0	20	53	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	54.55	45.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	37.89	61.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	28.95	71.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	27.40	72.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Peas
2 Farms Without Peas

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 12: COFFEE BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	0	11	0	0	0	0	0	0	0
REGION 2	1	0	94	0	0	0	0	0	0	0
REGION 3	0	31	45	0	0	0	0	0	0	0
REGION 4	0	0	73	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	0.0	98.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	40.79	59.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	0.0	0.0	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Coffee
2 Farms Without Coffee

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix - 17

TABLE 13: ENSETE BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	0	11	0	0	0	0	0	0	0
REGION 2	2	3	90	0	0	0	0	0	0	0
REGION 3	0	49	27	0	0	0	0	0	0	0
REGION 4	2	3	68	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	2.11	3.16	94.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	64.47	35.53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	2.74	4.11	93.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Farms With Ensete
2 Farms Without Ensete

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 14: TERRACING BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	7	2	2	0	0	0	0	0	0
REGION 2	3	20	68	4	0	0	0	0	0	0
REGION 3	0	22	50	4	0	0	0	0	0	0
REGION 4	2	7	61	3	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	63.64	18.18	18.18	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	3.16	21.05	71.58	4.21	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	28.95	65.79	5.26	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	2.74	9.59	83.56	4.11	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 15: BUNDING BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	4	5	2	0	0	0	0	0	0
REGION 2	0	12	77	6	0	0	0	0	0	0
REGION 3	1	5	66	4	0	0	0	0	0	0
REGION 4	4	2	60	7	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	36.36	45.45	18.18	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	0.0	12.63	81.05	6.32	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	1.32	6.58	86.84	5.26	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	5.48	2.74	82.19	9.59	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 16: CONTOUR PLOUGHING BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	7	3	1	0	0	0	0	0	0
REGION 2	1	16	74	4	0	0	0	0	0	0
REGION 3	0	16	55	5	0	0	0	0	0	0
REGION 4	2	5	57	9	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	63.64	27.27	9.09	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	16.84	77.89	4.21	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	21.05	72.37	6.58	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	2.74	6.85	78.09	12.33	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 17: AFFORESTATION BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	5	5	1	0	0	0	0	0	0
REGION 2	3	10	78	4	0	0	0	0	0	0
REGION 3	0	1	69	6	0	0	0	0	0	0
REGION 4	2	8	57	6	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	45.45	45.45	9.09	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	3.16	10.53	82.11	4.21	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	1.32	90.79	7.89	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	2.74	10.96	78.09	8.22	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Practised
2 Not Practised 4 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 18: GRASSING BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	5	5	1	0	0	0	0	0	0
REGION 2	2	19	72	2	0	0	0	0	0	0
REGION 3	0	7	65	4	0	0	0	0	0	0
REGION 4	2	13	54	2	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	45.45	45.45	9.09	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	2.11	20.00	75.79	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	9.21	85.53	5.26	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	2.74	17.81	76.71	2.74	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Practised
2 Not Practised 3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 19: FERTILISERS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	2	1	7	1	0	0	0	0	0	0
REGION 2	20	4	69	2	0	0	0	0	0	0
REGION 3	2	7	67	0	0	0	0	0	0	0
REGION 4	10	8	53	2	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	18.18	9.09	63.64	9.09	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	21.05	4.21	72.63	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	2.63	9.21	88.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	13.70	10.96	72.60	2.74	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Used
2 Not Used 3 Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 20: MANURES BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	8	3	0	0	0	0	0	0	0
REGION 2	4	47	43	1	0	0	0	0	0	0
REGION 3	1	37	37	1	0	0	0	0	0	0
REGION 4	3	48	21	1	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	72.73	27.27	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	4.21	49.47	45.26	1.05	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	1.32	48.68	48.68	1.32	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	4.11	65.75	28.77	1.37	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Used
2 Not Used 3 Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 21: GRASS BURNING BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	4	7	0	0	0	0	0	0	0
REGION 2	7	29	58	1	0	0	0	0	0	0
REGION 3	2	5	69	0	0	0	0	0	0	0
REGION 4	3	17	46	2	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	36.36	63.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	7.37	30.53	61.05	1.05	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	2.63	6.58	90.79	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	10.96	23.29	63.01	2.74	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Practised
2 Not Practised 3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

Table 22 Ownership/Tenancy Of Sampled Farms (By Agricultural Regions)

Region	No Reply		Gebbar		Chisegna		Rist Gult		Others	
	No	%	No	%	No	%	No	%	No	%
1	2	18.18	4	36.37	3	27.27	1	9.09	1	9.09
2	0	0.0	10	10.75	38	40.09	24	25.81	21	23.35
3	1	1.28	37	47.43	9	11.54	21	26.92	10	12.83
4	0	0.0	37	50.68	25	34.24	3	4.12	8	10.96
Total	3	1.18	88	34.51	75	29.41	49	23.14	40	11.76

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 24: USE OF MANURE BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	1	10	0	0	0	0	0	0	0
REGION 2	7	11	75	2	0	0	0	0	0	0
REGION 3	5	5	61	5	0	0	0	0	0	0
REGION 4	7	11	52	3	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	9.09	90.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	7.37	11.58	78.95	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	6.58	6.58	80.26	6.58	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	9.59	15.07	71.23	4.11	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Used
2 Not Used 3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 25: SUFFICIENCY OF WATER BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	0	9	2	0	0	0	0	0	0	0
REGION 2	1	65	27	2	0	0	0	0	0	0
REGION 3	0	56	20	0	0	0	0	0	0	0
REGION 4	3	45	23	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	81.82	18.18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	68.42	28.42	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	0.0	73.68	26.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	6.38	61.64	31.51	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Sufficient Water Available
2 Not Sufficient 3 Farmer Does Not Know

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 26: SUFFICIENCY OF GRASS BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3						
REGION 1	2	3	6	0	0	0	0	0	0	0
REGION 2	4	52	37	2	0	0	0	0	0	0
REGION 3	1	54	21	0	0	0	0	0	0	0
REGION 4	6	38	29	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	18.18	27.27	54.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	4.21	54.74	38.95	2.11	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	1.32	71.05	27.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	8.22	52.05	39.73	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Sufficient Grass Available
2 Not Sufficient 3 Farmer Does Not Know

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 27: INNOCULATION BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2							
REGION 1	0	7	4	0	0	0	0	0	0	0
REGION 2	5	80	10	0	0	0	0	0	0	0
REGION 3	8	55	13	0	0	0	0	0	0	0
REGION 4	9	57	7	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	63.64	36.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	5.26	84.21	10.53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	10.53	72.37	17.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 4	12.33	78.08	9.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply
1 Innoculated
2 Not Innoculated

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 28: CEREALS (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	11	0	0	0	0	0	0	0	0
REGION 2	1	92	2	0	0	0	0	0	0	0
REGION 3	1	36	17	4	6	12	0	0	0	0
REGION 4	2	71	0	0	0	0	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 2	1.05	96.84	2.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REGION 3	1.32	47.37	22.37	5.26	7.89	15.79	0.0	0.0	0.0	0.0
REGION 4	2.74	97.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 29: MEAT (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	0	3	1	6	1	0	0	0	0
REGION 2	2	1	22	19	50	1	0	0	0	0
REGION 3	1	2	18	20	31	4	0	0	0	0
REGION 4	2	1	18	12	38	2	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	27.27	9.09	54.54	9.09	0.0	0.0	0.0	0.0
REGION 2	2.11	1.05	23.16	20.00	52.63	1.05	0.0	0.0	0.0	0.0
REGION 3	1.32	2.63	23.68	26.32	40.79	5.26	0.0	0.0	0.0	0.0
REGION 4	2.74	1.37	24.66	16.44	52.05	2.74	0.0	0.0	0.0	0.0

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 30: VEGETABLES (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	1	3	0	3	4	0	0	0	0
REGION 2	5	9	21	14	12	34	0	0	0	0
REGION 3	3	21	15	9	9	19	0	0	0	0
REGION 4	4	13	14	3	2	31	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	9.09	27.27	0.0	27.27	36.36	0.0	0.0	0.0	0.0
REGION 2	5.26	9.47	22.11	14.74	12.63	35.79	0.0	0.0	0.0	0.0
REGION 3	3.95	27.63	19.74	11.84	11.84	25.00	0.0	0.0	0.0	0.0
REGION 4	5.48	26.03	19.18	4.11	2.74	42.47	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 On Rare Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 31: FRUIT (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	0	2	1	3	5	0	0	0	0
REGION 2	14	1	7	11	12	50	0	0	0	0
REGION 3	3	7	6	14	10	36	0	0	0	0
REGION 4	7	5	3	5	6	48	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	18.18	9.09	27.27	45.45	0.0	0.0	0.0	0.0
REGION 2	14.74	1.05	7.37	11.58	12.63	52.63	0.0	0.0	0.0	0.0
REGION 3	3.95	9.21	7.89	18.42	13.16	47.37	0.0	0.0	0.0	0.0
REGION 4	9.59	6.85	4.11	6.85	8.85	65.75	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 On Rare Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 32: MILK (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	2	3	1	5	0	0	0	0	0
REGION 2	2	37	35	5	13	3	0	0	0	0
REGION 3	1	31	32	3	7	2	0	0	0	0
REGION 4	2	30	24	1	11	5	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	18.18	27.27	9.09	45.45	0.0	0.0	0.0	0.0	0.0
REGION 2	2.11	38.95	36.84	5.26	13.68	3.16	0.0	0.0	0.0	0.0
REGION 3	1.32	40.79	42.11	3.95	9.21	2.63	0.0	0.0	0.0	0.0
REGION 4	2.74	41.10	32.88	1.37	15.07	6.85	0.0	0.0	0.0	0.0

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 33: MILK PRODUCTS (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	1	4	1	5	0	0	0	0	0
REGION 2	3	16	46	7	17	4	0	0	0	0
REGION 3	1	26	31	8	7	3	0	0	0	0
REGION 4	2	16	33	3	15	4	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	9.09	36.36	9.09	45.45	0.0	0.0	0.0	0.0	0.0
REGION 2	5.26	16.84	48.42	7.37	17.89	4.21	0.0	0.0	0.0	0.0
REGION 3	1.32	34.21	40.79	10.53	9.21	3.95	0.0	0.0	0.0	0.0
REGION 4	2.74	21.92	45.21	4.11	20.55	5.48	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 On Rare Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 34: ENSETE (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	0	0	0	0	11	0	0	0	0
REGION 2	9	3	5	4	5	69	0	0	0	0
REGION 3	3	60	5	1	3	4	0	0	0	0
REGION 4	2	6	3	0	2	60	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	0.0	0.0	0.0	100.00	0.0	0.0	0.0	0.0
REGION 2	9.47	3.16	5.26	4.21	5.26	72.63	0.0	0.0	0.0	0.0
REGION 3	3.95	78.95	6.58	1.32	3.95	5.26	0.0	0.0	0.0	0.0
REGION 4	2.74	8.22	4.11	0.0	2.74	82.19	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 On Rare Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 35: FISH (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	0	1	0	4	6	0	0	0	0
REGION 2	9	0	3	0	11	72	0	0	0	0
REGION 3	3	0	0	3	6	64	0	0	0	0
REGION 4	4	5	11	4	10	39	0	0	0	0

PERCENTAGE DISTRIBUTION

REGION 1	0.0	0.0	9.09	0.0	36.36	54.55	0.0	0.0	0.0	0.0
REGION 2	9.47	0.0	3.16	0.0	11.58	75.79	0.0	0.0	0.0	0.0
REGION 3	3.95	0.0	0.0	3.95	7.89	84.21	0.0	0.0	0.0	0.0
REGION 4	5.48	6.85	15.07	5.48	13.70	53.42	0.0	0.0	0.0	0.0

0 No Reply 1 Everyday 2 Once or Twice a Week
3 Once a Month 4 On Rare Occasions 5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 17

TABLE 36: EGGS (FOOD CONSUMPTION) BY AGRICULTURAL REGIONS

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5				
REGION 1	0	1	2	1	6	1	0	0	0	0
REGION 2	5	12	31	12	28	7	0	0	0	0
REGION 3	7	9	23	7	11	19	0	0	0	0
REGION 4	5	1	31	11	16	9	0	0	0	0

Source: Questionnaire Survey, C.P.Singh, 1969

0 No Reply 1 Everyday
2 Once or Twice a Week 3 Once a Month
4 On Rare Occasions 5 Never

PERCENTAGE DISTRIBUTION

REGION 1	0.0	9.09	18.18	9.09	54.55	9.09	0.0	0.0	0.0	0.0
REGION 2	5.26	12.63	32.63	12.63	29.47	7.37	0.0	0.0	0.0	0.0
REGION 3	9.21	11.84	30.26	9.21	14.47	25.00	0.0	0.0	0.0	0.0
REGION 4	6.85	1.37	42.47	15.07	21.92	12.33	0.0	0.0	0.0	0.0

Awraja Code for Appendix 18

Tables 1 - 36

Awraja	Name
1	Menz & Gishe
2	Merhabete
3	Yifat & Timuga
4	Tegulet
5	Selale
6	Jibat & Mecha
7	Menagesha
8	Yerer & Kereyu
9	Haykoch & Butajira
10	Chebo & Gurage
11	Kembata

(For the location of the awrajas see Figure 8 on page 125)

TABLE 1: TOTAL MEMBERS OF HOUSEHOLD

FREQUENCY DISTRIBUTION

		6.00	15.00	24.00	
AWRAJA	2	1	2	1	0
AWRAJA	3	8	10	1	0
AWRAJA	4	14	13	0	0
AWRAJA	5	5	12	3	0
AWRAJA	6	13	14	4	0
AWRAJA	7	17	12	0	0
AWRAJA	8	7	10	0	0
AWRAJA	9	17	19	0	1
AWRAJA	10	36	23	0	0
AWRAJA	11	7	5	0	0

PERCENTAGE DISTRIBUTION

		6.00	15.00	24.00	
AWRAJA	2	25.00	50.00	25.00	0.0
AWRAJA	3	42.11	52.63	5.26	0.0
AWRAJA	4	51.85	48.15	0.0	0.0
AWRAJA	5	25.00	60.00	15.00	0.0
AWRAJA	6	41.94	45.16	12.90	0.0
AWRAJA	7	58.62	41.38	0.0	0.0
AWRAJA	8	41.18	58.82	0.0	0.0
AWRAJA	9	45.95	51.35	0.0	2.70
AWRAJA	10	61.02	38.98	0.0	0.0
AWRAJA	11	58.33	41.67	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2
Source: Quesionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 2: TOTAL FARM AREA (GASHA)

FREQUENCY DISTRIBUTION

		0.50	2.25	4.00	
AWRAJA	2	0	3	0	1
AWRAJA	3	12	3	0	4
AWRAJA	4	7	14	3	3
AWRAJA	5	3	16	1	0
AWRAJA	6	7	21	0	3
AWRAJA	7	9	17	3	0
AWRAJA	8	0	3	6	8
AWRAJA	9	23	10	0	4
AWRAJA	10	34	23	1	1
AWRAJA	11	0	2	6	4

PERCENTAGE DISTRIBUTION

		0.50	2.25	4.00	
AWRAJA	2	0.0	75.00	0.0	25.00
AWRAJA	3	63.16	15.79	0.0	21.05
AWRAJA	4	25.93	51.85	11.11	11.11
AWRAJA	5	15.00	80.00	5.00	0.0
AWRAJA	6	22.58	67.74	0.0	9.68
AWRAJA	7	31.03	58.62	10.34	0.0
AWRAJA	8	0.0	17.65	35.29	47.06
AWRAJA	9	62.16	27.03	0.0	10.81
AWRAJA	10	57.63	38.98	1.69	1.69
AWRAJA	11	0.0	16.67	50.00	33.33

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 3: CULTIVATED AREA (GASHA)

FREQUENCY DISTRIBUTION

		0.50	2.25	4.00	
AWRAJA	2	0	3	1	0
AWRAJA	3	12	3	0	4
AWRAJA	4	8	16	1	2
AWRAJA	5	3	16	1	0
AWRAJA	6	13	15	2	1
AWRAJA	7	14	14	1	0
AWRAJA	8	0	6	7	4
AWRAJA	9	27	8	0	2
AWRAJA	10	47	10	2	0
AWRAJA	11	0	4	6	2

PERCENTAGE DISTRIBUTION

		0.50	2.25	4.00	
AWRAJA	2	0.0	75.00	25.00	0.0
AWRAJA	3	63.16	15.79	0.0	21.05
AWRAJA	4	29.63	59.26	3.70	7.41
AWRAJA	5	15.00	80.00	5.00	0.0
AWRAJA	6	41.94	48.39	6.45	3.23
AWRAJA	7	48.28	48.28	3.45	0.0
AWRAJA	8	0.0	35.29	41.18	23.53
AWRAJA	9	72.97	21.62	0.0	5.41
AWRAJA	10	79.66	16.95	3.39	0.0
AWRAJA	11	0.0	33.33	50.00	16.67

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 4: AREA UNDER VEGETABLES (GASHA)

FREQUENCY DISTRIBUTION

			0.01	0.10	0.20
AWRAJA	2	2	1	0	1
AWRAJA	3	14	4	0	1
AWRAJA	4	25	1	1	0
AWRAJA	5	20	0	0	0
AWRAJA	6	29	0	1	1
AWRAJA	7	25	4	0	0
AWRAJA	8	17	0	0	0
AWRAJA	9	31	4	1	1
AWRAJA	10	33	19	2	5
AWRAJA	11	6	4	2	0

PERCENTAGE DISTRIBUTION

			0.01	0.10	0.20
AWRAJA	2	50.00	25.00	0.0	25.00
AWRAJA	3	73.68	21.05	0.0	5.26
AWRAJA	4	92.59	3.70	3.70	0.0
AWRAJA	5	100.00	0.0	0.0	0.0
AWRAJA	6	93.55	0.0	3.23	3.23
AWRAJA	7	86.21	13.79	0.0	0.0
AWRAJA	8	100.00	0.0	0.0	0.0
AWRAJA	9	83.78	10.81	2.70	2.70
AWRAJA	10	55.93	32.20	3.39	8.47
AWRAJA	11	50.00	33.33	16.67	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 5: AREA UNDER FRUITS (GASHA)

FREQUENCY DISTRIBUTION

			0.01	0.25	0.50
AWRAJA	2	2	2	0	0
AWRAJA	3	15	3	0	1
AWRAJA	4	25	2	0	0
AWRAJA	5	20	0	0	0
AWRAJA	6	30	0	0	1
AWRAJA	7	28	1	0	0
AWRAJA	8	17	0	0	0
AWRAJA	9	36	1	0	0
AWRAJA	10	53	6	0	0
AWRAJA	11	10	2	0	0

PERCENTAGE DISTRIBUTION

			0.01	0.25	0.50
AWRAJA	2	50.00	50.00	0.0	0.0
AWRAJA	3	78.95	15.79	0.0	5.26
AWRAJA	4	92.59	7.41	0.0	0.0
AWRAJA	5	100.00	0.0	0.0	0.0
AWRAJA	6	96.77	0.0	0.0	3.23
AWRAJA	7	96.55	3.45	0.0	0.0
AWRAJA	8	100.00	0.0	0.0	0.0
AWRAJA	9	97.30	2.70	0.0	0.0
AWRAJA	10	89.83	10.17	0.0	0.0
AWRAJA	11	83.33	16.67	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 6: AREA UNDER GRASSLANDS (GASHA)

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	0	2	0	2
AWRAJA	3	14	2	0	3
AWRAJA	4	10	10	1	6
AWRAJA	5	14	6	0	0
AWRAJA	6	13	15	1	2
AWRAJA	7	16	9	2	2
AWRAJA	8	7	10	0	0
AWRAJA	9	19	13	1	4
AWRAJA	10	36	19	1	3
AWRAJA	11	10	2	0	0

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	0.0	50.00	0.0	50.00
AWRAJA	3	73.68	10.53	0.0	15.79
AWRAJA	4	37.04	37.04	3.70	22.22
AWRAJA	5	70.00	30.00	0.0	0.0
AWRAJA	6	41.94	48.39	3.23	6.45
AWRAJA	7	55.17	31.03	6.90	6.90
AWRAJA	8	41.18	58.82	0.0	0.0
AWRAJA	9	51.35	35.14	2.70	10.81
AWRAJA	10	61.02	32.20	1.69	5.08
AWRAJA	11	83.33	16.67	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 7: AREA UNDER WOODLANDS (GASHA)

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	1	2	0	1
AWRAJA	3	15	2	0	2
AWRAJA	4	17	5	0	5
AWRAJA	5	16	4	0	0
AWRAJA	6	21	8	0	2
AWRAJA	7	17	10	0	2
AWRAJA	8	14	3	0	0
AWRAJA	9	25	9	0	3
AWRAJA	10	47	9	1	2
AWRAJA	11	12	0	0	0

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	25.00	50.00	0.0	25.00
AWRAJA	3	78.95	10.53	0.0	10.53
AWRAJA	4	62.96	18.52	0.0	18.52
AWRAJA	5	80.00	20.00	0.0	0.0
AWRAJA	6	67.74	25.81	0.0	6.45
AWRAJA	7	58.62	34.48	0.0	6.90
AWRAJA	8	82.35	17.65	0.0	0.0
AWRAJA	9	67.57	24.32	0.0	8.11
AWRAJA	10	79.66	15.25	1.69	3.39
AWRAJA	11	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 8: AREA IRRIGATED

FREQUENCY DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	1	3	0	0
AWRAJA	3	18	1	0	0
AWRAJA	4	21	3	1	2
AWRAJA	5	18	2	0	0
AWRAJA	6	27	4	0	0
AWRAJA	7	27	2	0	0
AWRAJA	8	17	0	0	0
AWRAJA	9	36	0	0	1
AWRAJA	10	57	2	0	0
AWRAJA	11	12	0	0	0

PERCENTAGE DISTRIBUTION

		0.01	0.25	0.50	
AWRAJA	2	25.00	75.00	0.0	0.0
AWRAJA	3	94.74	5.26	0.0	0.0
AWRAJA	4	77.78	11.11	3.70	7.41
AWRAJA	5	90.00	10.00	0.0	0.0
AWRAJA	6	87.10	12.90	0.0	0.0
AWRAJA	7	93.10	6.90	0.0	0.0
AWRAJA	8	100.00	0.0	0.0	0.0
AWRAJA	9	97.30	0.0	0.0	2.70
AWRAJA	10	96.61	3.39	0.0	0.0
AWRAJA	11	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 9: SHEEP

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	2	2	0	0
AWRAJA	3	17	2	0	0
AWRAJA	4	18	9	0	0
AWRAJA	5	7	13	0	0
AWRAJA	6	13	18	0	0
AWRAJA	7	11	18	0	0
AWRAJA	8	3	14	0	0
AWRAJA	9	20	16	1	0
AWRAJA	10	46	13	0	0
AWRAJA	11	3	9	0	0

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	50.00	50.00	0.0	0.0
AWRAJA	3	89.47	10.53	0.0	0.0
AWRAJA	4	66.67	33.33	0.0	0.0
AWRAJA	5	35.00	65.00	0.0	0.0
AWRAJA	6	41.94	58.06	0.0	0.0
AWRAJA	7	37.93	62.07	0.0	0.0
AWRAJA	8	17.65	82.35	0.0	0.0
AWRAJA	9	54.05	43.24	2.70	0.0
AWRAJA	10	77.97	22.03	0.0	0.0
AWRAJA	11	25.00	75.00	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 10: GOATS

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	3	1	0	0
AWRAJA	3	17	2	0	0
AWRAJA	4	26	1	0	0
AWRAJA	5	13	7	0	0
AWRAJA	6	17	14	0	0
AWRAJA	7	16	13	0	0
AWRAJA	8	3	14	0	0
AWRAJA	9	10	25	0	2
AWRAJA	10	33	26	0	0
AWRAJA	11	3	9	0	0

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	75.00	25.00	0.0	0.0
AWRAJA	3	89.47	10.53	0.0	0.0
AWRAJA	4	96.30	3.70	0.0	0.0
AWRAJA	5	65.00	35.00	0.0	0.0
AWRAJA	6	54.84	45.16	0.0	0.0
AWRAJA	7	55.17	44.83	0.0	0.0
AWRAJA	8	17.65	82.35	0.0	0.0
AWRAJA	9	27.03	67.57	0.0	5.41
AWRAJA	10	55.93	44.07	0.0	0.0
AWRAJA	11	25.00	75.00	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 11: COWS

FREQUENCY DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	2	2	0	0
AWRAJA	3	12	7	0	0
AWRAJA	4	13	14	0	0
AWRAJA	5	5	15	0	0
AWRAJA	6	5	26	0	0
AWRAJA	7	4	25	0	0
AWRAJA	8	1	16	0	0
AWRAJA	9	4	29	1	3
AWRAJA	10	14	43	1	1
AWRAJA	11	0	12	0	0

PERCENTAGE DISTRIBUTION

		0.01	50.00	100.00	
AWRAJA	2	50.00	50.00	0.0	0.0
AWRAJA	3	63.16	36.84	0.0	0.0
AWRAJA	4	48.15	51.85	0.0	0.0
AWRAJA	5	25.00	75.00	0.0	0.0
AWRAJA	6	16.13	83.87	0.0	0.0
AWRAJA	7	13.79	86.21	0.0	0.0
AWRAJA	8	5.88	94.12	0.0	0.0
AWRAJA	9	10.81	78.38	2.70	8.11
AWRAJA	10	23.73	72.88	1.69	1.69
AWRAJA	11	0.0	100.00	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 18

TABLE 12: CHICKEN

FREQUENCY DISTRIBUTION

		0.01	10.00	20.00	
AWRAJA	2	2	1	0	1
AWRAJA	3	12	7	0	0
AWRAJA	4	19	7	1	0
AWRAJA	5	9	8	1	2
AWRAJA	6	4	17	6	4
AWRAJA	7	11	16	1	1
AWRAJA	8	2	9	5	1
AWRAJA	9	11	19	3	4
AWRAJA	10	27	26	3	3
AWRAJA	11	1	10	0	1

PERCENTAGE DISTRIBUTION

		0.01	10.00	20.00	
AWRAJA	2	50.00	25.00	0.0	25.00
AWRAJA	3	63.16	36.84	0.0	0.0
AWRAJA	4	70.37	25.93	3.70	0.0
AWRAJA	5	45.00	40.00	5.00	10.00
AWRAJA	6	12.90	54.84	19.35	12.90
AWRAJA	7	37.93	55.17	3.45	3.45
AWRAJA	8	11.76	52.94	29.41	5.88
AWRAJA	9	29.73	51.35	8.11	10.81
AWRAJA	10	45.76	44.07	5.08	5.08
AWRAJA	11	8.33	83.33	0.0	8.33

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 13: OXEN

FREQUENCY DISTRIBUTION

		0.01	10.00	20.00	
AWRAJA	2	2	2	0	0
AWRAJA	3	9	11	0	0
AWRAJA	4	13	14	0	0
AWRAJA	5	7	12	1	0
AWRAJA	6	2	27	1	1
AWRAJA	7	5	24	0	0
AWRAJA	8	1	16	0	0
AWRAJA	9	7	26	2	2
AWRAJA	10	21	35	0	3
AWRAJA	11	1	11	0	0

PERCENTAGE DISTRIBUTION

		0.01	10.00	20.00	
AWRAJA	2	50.00	50.00	0.0	0.0
AWRAJA	3	42.11	57.89	0.0	0.0
AWRAJA	4	48.15	51.85	0.0	0.0
AWRAJA	5	35.00	60.00	5.00	0.0
AWRAJA	6	6.45	87.10	3.23	3.23
AWRAJA	7	17.24	82.76	0.0	0.0
AWRAJA	8	5.88	94.12	0.0	0.0
AWRAJA	9	18.92	70.27	5.41	5.41
AWRAJA	10	35.59	59.32	0.0	5.08
AWRAJA	11	8.33	91.67	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19 Table 1 Code

0 No Reply
1 Upland Farms
2 Lowland Farms

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 1: FARM TYPE

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	4	0	0	0	0
AWRAJA	3	0	4	15	0	0	0
AWRAJA	4	0	27	0	0	0	0
AWRAJA	5	0	17	3	0	0	0
AWRAJA	6	0	31	0	0	0	0
AWRAJA	7	5	24	0	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	0	6	31	0	0	0
AWRAJA	10	0	51	8	0	0	0
AWRAJA	11	0	9	3	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	3	0.0	21.05	78.95	0.0	0.0	0.0
AWRAJA	4	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	5	0.0	85.00	15.00	0.0	0.0	0.0
AWRAJA	6	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	7	17.24	82.76	0.0	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	0.0	16.22	83.78	0.0	0.0	0.0
AWRAJA	10	0.0	86.44	13.56	0.0	0.0	0.0
AWRAJA	11	0.0	75.00	25.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 2 Code

0 No Reply
1 Illiterate
2 Read and Write
3 Grade 2-4
4 Grade 4-9
5 Over 9th Grade

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 2: EDUCATIONAL LEVEL

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	0	0	0	1
AWRAJA	3	1	16	2	0	0	0
AWRAJA	4	0	22	5	0	0	0
AWRAJA	5	0	16	4	0	0	0
AWRAJA	6	0	26	4	0	0	1
AWRAJA	7	0	27	0	2	0	0
AWRAJA	8	0	17	0	0	0	0
AWRAJA	9	2	29	5	1	0	0
AWRAJA	10	0	49	7	2	0	1
AWRAJA	11	0	12	0	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	0.0	0.0	0.0	25.00
AWRAJA	3	5.26	84.21	10.53	0.0	0.0	0.0
AWRAJA	4	0.0	81.48	18.52	0.0	0.0	0.0
AWRAJA	5	0.0	80.00	20.00	0.0	0.0	0.0
AWRAJA	6	0.0	83.87	12.90	0.0	0.0	3.23
AWRAJA	7	0.0	93.10	0.0	6.90	0.0	0.0
AWRAJA	8	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	9	5.41	78.38	13.51	2.70	0.0	0.0
AWRAJA	10	0.0	83.05	11.86	3.39	0.0	1.69
AWRAJA	11	0.0	100.00	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 3 Code

0 No Reply
1 None
2 Farming
3 Farming and Trading

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 3: OCCUPATION

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	4	0	0	0
AWRAJA	3	1	0	14	0	0	0
AWRAJA	4	0	0	22	0	0	0
AWRAJA	5	0	0	20	0	0	0
AWRAJA	6	0	0	31	0	0	0
AWRAJA	7	0	0	29	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	0	0	34	0	0	1
AWRAJA	10	0	0	55	0	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	3	5.26	0.0	73.68	0.0	0.0	0.0
AWRAJA	4	0.0	0.0	81.48	0.0	0.0	0.0
AWRAJA	5	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	6	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	7	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	0.0	0.0	91.89	0.0	0.0	2.70
AWRAJA	10	0.0	0.0	93.22	0.0	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 4 Code

0 No Reply
1 Grown
2 Not Grown

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 4: BARLEY

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0	3	1	0	0	0
AWRAJA 3	0	5	14	0	0	0
AWRAJA 4	0	19	8	0	0	0
AWRAJA 5	0	17	3	0	0	0
AWRAJA 6	0	15	16	0	0	0
AWRAJA 7	0	18	11	0	0	0
AWRAJA 8	0	0	17	0	0	0
AWRAJA 9	0	12	25	0	0	0
AWRAJA 10	0	14	45	0	0	0
AWRAJA 11	0	2	10	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA 3	0.0	26.32	73.68	0.0	0.0	0.0
AWRAJA 4	0.0	70.37	29.63	0.0	0.0	0.0
AWRAJA 5	0.0	85.00	15.00	0.0	0.0	0.0
AWRAJA 6	0.0	48.39	51.61	0.0	0.0	0.0
AWRAJA 7	0.0	62.07	37.93	0.0	0.0	0.0
AWRAJA 8	0.0	00.00	100.0	0.0	0.0	0.0
AWRAJA 9	0.0	32.43	67.57	0.0	0.0	0.0
AWRAJA 10	0.0	23.73	76.27	0.0	0.0	0.0
AWRAJA 11	0.0	16.67	83.33	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 5 Code

0 No Reply
1 Farms with Wheat
2 Farms Without Wheat

(See Figure 10)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 5: WHEAT

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	1	0	0	0
AWRAJA	3	0	7	12	0	0	0
AWRAJA	4	0	14	13	0	0	0
AWRAJA	5	0	14	6	0	0	0
AWRAJA	6	0	28	3	0	0	0
AWRAJA	7	0	27	2	0	0	0
AWRAJA	8	0	7	10	0	0	0
AWRAJA	9	0	7	30	0	0	0
AWRAJA	10	0	24	35	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA	3	0.0	36.84	63.16	0.0	0.0	0.0
AWRAJA	4	0.0	51.85	48.15	0.0	0.0	0.0
AWRAJA	5	0.0	70.00	30.00	0.0	0.0	0.0
AWRAJA	6	0.0	90.32	9.68	0.0	0.0	0.0
AWRAJA	7	0.0	93.10	6.90	0.0	0.0	0.0
AWRAJA	8	0.0	41.18	58.82	0.0	0.0	0.0
AWRAJA	9	0.0	18.92	81.08	0.0	0.0	0.0
AWRAJA	10	0.0	40.68	59.32	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 6 Code

0 No Reply
1 Farms With Maize
2 Farms Without Maize

(See Figure 12)

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 6: MAIZE

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	3	0	0	0
AWRAJA	3	1	14	4	0	0	0
AWRAJA	4	0	4	23	0	0	0
AWRAJA	5	0	0	20	0	0	0
AWRAJA	6	0	15	16	0	0	0
AWRAJA	7	1	3	25	0	0	0
AWRAJA	8	0	14	3	0	0	0
AWRAJA	9	0	35	2	0	0	0
AWRAJA	10	0	31	28	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	75.00	0.0	0.0	0.0
AWRAJA	3	5.26	73.68	21.05	0.0	0.0	0.0
AWRAJA	4	0.0	14.81	85.19	0.0	0.0	0.0
AWRAJA	5	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	6	0.0	48.39	51.61	0.0	0.0	0.0
AWRAJA	7	3.45	10.34	86.21	0.0	0.0	0.0
AWRAJA	8	0.0	82.35	17.65	0.0	0.0	0.0
AWRAJA	9	0.0	94.59	5.41	0.0	0.0	0.0
AWRAJA	10	0.0	52.54	47.46	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 7 -Code

0 No Reply
1 Farms With Teff
2 Farms Without Teff

(See Figure 11)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 7: TEFF

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	1	0	0	0
AWRAJA	3	0	14	5	0	0	0
AWRAJA	4	0	2	25	0	0	0
AWRAJA	5	0	13	7	0	0	0
AWRAJA	6	0	28	3	0	0	0
AWRAJA	7	1	25	3	0	0	0
AWRAJA	8	0	17	0	0	0	0
AWRAJA	9	0	22	15	0	0	0
AWRAJA	10	0	37	22	0	0	0
AWRAJA	11	0	9	3	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA	3	0.0	73.68	26.32	0.0	0.0	0.0
AWRAJA	4	0.0	7.41	92.59	0.0	0.0	0.0
AWRAJA	5	0.0	65.00	35.00	0.0	0.0	0.0
AWRAJA	6	0.0	90.32	9.68	0.0	0.0	0.0
AWRAJA	7	3.45	86.21	10.34	0.0	0.0	0.0
AWRAJA	8	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	9	0.0	59.46	40.54	0.0	0.0	0.0
AWRAJA	10	0.0	62.71	37.29	0.0	0.0	0.0
AWRAJA	11	0.0	75.00	25.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCERPORATED INTO AWRAJA 2

Appendix 19 Table 8 Code

0 No Reply
1 Farms With Sorghum
2 Farms Without Sorghum

Source: Questionnaire Survey, C.P. Singh, 1969.

Appendix 19

TABLE 8: SORGHUM

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0	1	3	0	0	0
AWRAJA 3	0	6	13	0	0	0
AWRAJA 4	0	0	27	0	0	0
AWRAJA 5	0	3	17	0	0	0
AWRAJA 6	0	4	27	0	0	0
AWRAJA 7	1	1	27	0	0	0
AWRAJA 8	0	8	9	0	0	0
AWRAJA 9	0	8	29	0	0	0
AWRAJA 10	0	11	48	0	0	0
AWRAJA 11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0.0	25.00	75.00	0.0	0.0	0.0
AWRAJA 3	0.0	31.58	68.42	0.0	0.0	0.0
AWRAJA 4	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA 5	0.0	15.00	85.00	0.0	0.0	0.0
AWRAJA 6	0.0	12.90	87.10	0.0	0.0	0.0
AWRAJA 7	3.45	3.45	93.10	0.0	0.0	0.0
AWRAJA 8	0.0	47.06	52.94	0.0	0.0	0.0
AWRAJA 9	0.0	21.62	78.38	0.0	0.0	0.0
AWRAJA 10	0.0	18.64	81.36	0.0	0.0	0.0
AWRAJA 11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 9 Code

0 No Reply
1 Farms With Bean
2 Farms Without Bean

(See Figure 14)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 9: BEAN

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	1	0	0	0
AWRAJA	3	0	4	15	0	0	0
AWRAJA	4	0	22	5	0	0	0
AWRAJA	5	0	16	4	0	0	0
AWRAJA	6	0	13	18	0	0	0
AWRAJA	7	0	17	12	0	0	0
AWRAJA	8	0	10	7	0	0	0
AWRAJA	9	0	12	25	0	0	0
AWRAJA	10	0	10	49	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA	3	0.0	21.05	78.95	0.0	0.0	0.0
AWRAJA	4	0.0	81.48	18.52	0.0	0.0	0.0
AWRAJA	5	0.0	80.00	20.00	0.0	0.0	0.0
AWRAJA	6	0.0	41.94	58.06	0.0	0.0	0.0
AWRAJA	7	0.0	58.62	41.38	0.0	0.0	0.0
AWRAJA	8	0.0	58.82	41.18	0.0	0.0	0.0
AWRAJA	9	0.0	32.43	67.57	0.0	0.0	0.0
AWRAJA	10	0.0	16.95	83.05	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 10 Code

0 No Reply
1 Farms With Chick Peas
2 Farms Without Chick Peas

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 10: CHICK PEAS

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	3	0	0	0
AWRAJA	3	0	0	19	0	0	0
AWRAJA	4	0	2	25	0	0	0
AWRAJA	5	0	1	19	0	0	0
AWRAJA	6	0	20	11	0	0	0
AWRAJA	7	1	16	12	0	0	0
AWRAJA	8	0	13	4	0	0	0
AWRAJA	9	0	0	37	0	0	0
AWRAJA	10	1	26	32	0	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	75.00	0.0	0.0	0.0
AWRAJA	3	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	4	0.0	7.41	92.59	0.0	0.0	0.0
AWRAJA	5	0.0	5.00	95.00	0.0	0.0	0.0
AWRAJA	6	0.0	64.52	35.48	0.0	0.0	0.0
AWRAJA	7	3.45	55.17	41.38	0.0	0.0	0.0
AWRAJA	8	0.0	76.47	23.53	0.0	0.0	0.0
AWRAJA	9	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	10	1.69	44.07	54.24	0.0	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 11 Code

0 No Reply
1 Famrs With Peas
2 Farms Without Peas

(See Figure 15)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 11: PEAS

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	3	0	0	0
AWRAJA	3	0	6	13	0	0	0
AWRAJA	4	0	5	22	0	0	0
AWRAJA	5	0	12	8	0	0	0
AWRAJA	6	0	12	19	0	0	0
AWRAJA	7	1	15	13	0	0	0
AWRAJA	8	0	11	6	0	0	0
AWRAJA	9	0	8	29	0	0	0
AWRAJA	10	0	8	51	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	75.00	0.0	0.0	0.0
AWRAJA	3	0.0	31.58	68.42	0.0	0.0	0.0
AWRAJA	4	0.0	18.52	81.48	0.0	0.0	0.0
AWRAJA	5	0.0	60.00	40.00	0.0	0.0	0.0
AWRAJA	6	0.0	38.71	61.29	0.0	0.0	0.0
AWRAJA	7	3.45	51.72	44.83	0.0	0.0	0.0
AWRAJA	8	0.0	64.71	35.29	0.0	0.0	0.0
AWRAJA	9	0.0	21.62	78.38	0.0	0.0	0.0
AWRAJA	10	0.0	13.56	86.44	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 12 Code

0 No Reply
1 Farms With Coffee
2 Farms Without Coffee

(See Figure 16)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 12: COFFEE

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	4	0	0	0
AWRAJA	3	0	0	19	0	0	0
AWRAJA	4	0	0	27	0	0	0
AWRAJA	5	0	0	20	0	0	0
AWRAJA	6	0	2	29	0	0	0
AWRAJA	7	1	0	28	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	0	0	37	0	0	0
AWRAJA	10	0	23	36	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	3	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	4	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	5	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	6	0.0	6.45	93.55	0.0	0.0	0.0
AWRAJA	7	3.45	0.0	96.55	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	10	0.0	38.98	61.02	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 13 Code

0 No Reply
1 Farms With Ensete
2 Farms Without Ensete

(See Figure 13)

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 13: ENSETE

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	4	0	0	0
AWRAJA	3	0	0	19	0	0	0
AWRAJA	4	3	0	24	0	0	0
AWRAJA	5	0	0	20	0	0	0
AWRAJA	6	0	3	28	0	0	0
AWRAJA	7	1	3	25	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	0	3	34	0	0	0
AWRAJA	10	0	40	19	0	0	0
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	3	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	4	11.11	0.0	88.89	0.0	0.0	0.0
AWRAJA	5	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	6	0.0	9.68	90.32	0.0	0.0	0.0
AWRAJA	7	3.45	10.34	86.21	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	0.0	8.11	91.89	0.0	0.0	0.0
AWRAJA	10	0.0	67.80	32.20	0.0	0.0	0.0
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 14 Code

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 14: TERRACING

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	1	2	0	0
AWRAJA	3	1	5	11	2	0	0
AWRAJA	4	0	9	16	2	0	0
AWRAJA	5	2	6	12	0	0	0
AWRAJA	6	0	8	19	4	0	0
AWRAJA	7	1	7	19	2	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	1	0	36	0	0	0
AWRAJA	10	0	20	38	1	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	25.00	50.00	0.0	0.0
AWRAJA	3	5.26	26.32	57.89	10.53	0.0	0.0
AWRAJA	4	0.0	33.33	59.26	7.41	0.0	0.0
AWRAJA	5	10.00	30.00	60.00	0.0	0.0	0.0
AWRAJA	6	0.0	25.81	61.29	12.90	0.0	0.0
AWRAJA	7	3.45	24.14	65.52	6.90	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	2.70	0.0	97.30	0.0	0.0	0.0
AWRAJA	10	0.0	33.90	64.41	1.69	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 15 Code

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 15: BUNDING

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	1	2	0	0
AWRAJA	3	2	2	13	2	0	0
AWRAJA	4	0	4	15	8	0	0
AWRAJA	5	0	8	12	0	0	0
AWRAJA	6	1	0	26	4	0	0
AWRAJA	7	0	1	26	2	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	2	1	34	0	0	0
AWRAJA	10	0	6	52	1	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	25.00	50.00	0.0	0.0
AWRAJA	3	10.53	10.53	68.42	10.53	0.0	0.0
AWRAJA	4	0.0	14.81	55.56	29.63	0.0	0.0
AWRAJA	5	0.0	40.00	60.00	0.0	0.0	0.0
AWRAJA	6	3.23	0.0	83.87	12.90	0.0	0.0
AWRAJA	7	0.0	3.45	89.66	6.90	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	5.41	2.70	91.89	0.0	0.0	0.0
AWRAJA	10	0.0	10.17	88.14	1.69	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 16 Code

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 16: CONTOUR PLOUGHING

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0	3	0	1	0	0
AWRAJA 3	1	5	10	3	0	0
AWRAJA 4	0	4	14	9	0	0
AWRAJA 5	1	5	14	0	0	0
AWRAJA 6	0	4	22	5	0	0
AWRAJA 7	0	9	20	0	0	0
AWRAJA 8	0	0	17	0	0	0
AWRAJA 9	1	1	34	1	0	0
AWRAJA 10	0	13	46	0	0	0
AWRAJA 11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0.0	75.00	0.0	25.00	0.0	0.0
AWRAJA 3	5.26	26.32	52.63	15.79	0.0	0.0
AWRAJA 4	0.0	14.81	51.85	33.33	0.0	0.0
AWRAJA 5	5.00	25.00	70.00	0.0	0.0	0.0
AWRAJA 6	0.0	12.90	70.97	16.13	0.0	0.0
AWRAJA 7	0.0	31.03	68.97	0.0	0.0	0.0
AWRAJA 8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA 9	2.70	2.70	91.89	2.70	0.0	0.0
AWRAJA 10	0.0	22.03	77.97	0.0	0.0	0.0
AWRAJA 11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 17 Code

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 17: AFFORESTATION

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	2	1	1	0	0
AWRAJA	3	1	9	8	1	0	0
AWRAJA	4	2	2	15	8	0	0
AWRAJA	5	1	3	16	0	0	0
AWRAJA	6	0	1	23	7	0	0
AWRAJA	7	0	6	23	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	1	1	35	0	0	0
AWRAJA	10	0	0	59	0	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	50.00	25.00	25.00	0.0	0.0
AWRAJA	3	5.26	47.37	42.11	5.26	0.0	0.0
AWRAJA	4	7.41	7.41	55.56	29.63	0.0	0.0
AWRAJA	5	5.00	15.00	80.00	0.0	0.0	0.0
AWRAJA	6	0.0	3.23	74.19	22.58	0.0	0.0
AWRAJA	7	0.0	20.69	79.31	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	2.70	2.70	94.59	0.0	0.0	0.0
AWRAJA	10	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 18 Code

0 No Reply
1 Practised
2 Not Practised
3 System Not Known To Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 18: GRASSING

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	0	1	0	0
AWRAJA	3	1	9	8	1	0	0
AWRAJA	4	1	13	10	3	0	0
AWRAJA	5	1	2	17	0	0	0
AWRAJA	6	0	9	18	4	0	0
AWRAJA	7	0	5	24	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	1	1	35	0	0	0
AWRAJA	10	0	1	58	0	0	0
AWRAJA	11	0	1	11	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	0.0	25.00	0.0	0.0
AWRAJA	3	5.26	47.37	42.11	5.26	0.0	0.0
AWRAJA	4	3.70	48.15	37.04	11.11	0.0	0.0
AWRAJA	5	5.00	10.00	85.00	0.0	0.0	0.0
AWRAJA	6	0.0	29.03	58.06	12.90	0.0	0.0
AWRAJA	7	0.0	17.24	82.76	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	2.70	2.70	94.59	0.0	0.0	0.0
AWRAJA	10	0.0	1.69	98.31	0.0	0.0	0.0
AWRAJA	11	0.0	8.33	91.67	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 19 Code

0 No Reply
1 Used
2 Not Used
3 Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 19: FERTILISERS

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	2	1	0	0
AWRAJA	3	2	5	11	1	0	0
AWRAJA	4	12	3	11	1	0	0
AWRAJA	5	4	0	14	2	0	0
AWRAJA	6	3	8	20	0	0	0
AWRAJA	7	6	2	21	0	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	5	1	31	0	0	0
AWRAJA	10	2	0	57	0	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	50.00	25.00	0.0	0.0
AWRAJA	3	10.53	26.32	57.89	5.26	0.0	0.0
AWRAJA	4	44.44	11.11	40.74	3.70	0.0	0.0
AWRAJA	5	20.00	0.0	70.00	10.00	0.0	0.0
AWRAJA	6	9.68	25.81	64.52	0.0	0.0	0.0
AWRAJA	7	20.69	6.90	72.41	0.0	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	13.51	2.70	83.78	0.0	0.0	0.0
AWRAJA	10	3.39	0.0	96.61	0.0	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 20 Code

0 - No Reply
1 Used
2 Not Used
3 Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 20: MANURES

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	1	0	0	0
AWRAJA	3	1	7	10	1	0	0
AWRAJA	4	0	16	11	0	0	0
AWRAJA	5	1	6	12	1	0	0
AWRAJA	6	1	21	8	1	0	0
AWRAJA	7	3	15	11	0	0	0
AWRAJA	8	0	17	0	0	0	0
AWRAJA	9	2	23	12	0	0	0
AWRAJA	10	0	20	39	0	0	0
AWRAJA	11	0	12	0	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA	3	5.26	36.84	52.63	5.26	0.0	0.0
AWRAJA	4	0.0	59.26	40.74	0.0	0.0	0.0
AWRAJA	5	5.00	30.00	60.00	5.00	0.0	0.0
AWRAJA	6	3.23	67.74	25.81	3.23	0.0	0.0
AWRAJA	7	10.34	51.72	37.93	0.0	0.0	0.0
AWRAJA	8	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	9	5.41	62.16	32.43	0.0	0.0	0.0
AWRAJA	10	0.0	33.90	66.10	0.0	0.0	0.0
AWRAJA	11	0.0	100.00	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 21 Code

0 No Reply
1 Practised
2 Not Practised
3 Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 21: GRASS BURNING

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	1	3	0	0	0
AWRAJA	3	2	8	7	2	0	0
AWRAJA	4	8	8	10	1	0	0
AWRAJA	5	0	11	9	0	0	0
AWRAJA	6	2	7	22	0	0	0
AWRAJA	7	3	9	17	0	0	0
AWRAJA	8	1	1	15	0	0	0
AWRAJA	9	1	10	26	0	0	0
AWRAJA	10	0	0	59	0	0	0
AWRAJA	11	0	0	12	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	25.00	75.00	0.0	0.0	0.0
AWRAJA	3	10.53	42.11	36.84	10.53	0.0	0.0
AWRAJA	4	29.63	29.63	37.04	3.70	0.0	0.0
AWRAJA	5	0.0	55.00	45.00	0.0	0.0	0.0
AWRAJA	6	6.45	22.58	70.97	0.0	0.0	0.0
AWRAJA	7	10.34	31.03	58.62	0.0	0.0	0.0
AWRAJA	8	5.88	5.88	88.24	0.0	0.0	0.0
AWRAJA	9	2.70	27.03	70.27	0.0	0.0	0.0
AWRAJA	10	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	11	0.0	0.0	100.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 22 Code

0 No Reply
1 Gebbar
4 Chisegna
5 Others

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 22: OWNERSHIP/TENANCY

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0	1	0	0	1	0
AWRAJA 3	2	4	0	0	0	1
AWRAJA 4	0	3	0	0	1	1
AWRAJA 5	0	8	0	0	1	0
AWRAJA 6	1	3	0	0	9	0
AWRAJA 7	0	5	0	0	13	2
AWRAJA 8	0	10	0	0	2	1
AWRAJA 9	1	19	0	0	10	0
AWRAJA 10	0	23	0	0	22	4
AWRAJA 11	0	12	0	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0.0	25.00	0.0	0.0	25.00	0.0
AWRAJA 3	10.53	21.05	0.0	0.0	0.0	5.26
AWRAJA 4	0.0	11.11	0.0	0.0	3.70	3.70
AWRAJA 5	0.0	40.00	0.0	0.0	5.00	0.0
AWRAJA 6	3.23	9.68	0.0	0.0	29.03	0.0
AWRAJA 7	0.0	17.24	0.0	0.0	44.83	6.90
AWRAJA 8	0.0	58.82	0.0	0.0	11.76	5.88
AWRAJA 9	2.70	51.35	0.0	0.0	27.03	0.0
AWRAJA 10	0.0	38.98	0.0	0.0	37.29	6.78
AWRAJA 11	0.0	100.00	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 23 Code

0 No Reply
1 None
2 Lake
3 River
4 Stream
5 Well

Source: Questionnaire Survey, C.P.Singh, 1969

Appendix 19

TABLE 23: SOURCE OF IRRIGATION

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	1	0	0	1	1	1
AWRAJA	3	1	17	0	1	0	0
AWRAJA	4	21	0	0	5	1	0
AWRAJA	5	16	0	0	2	2	0
AWRAJA	6	25	0	0	6	0	0
AWRAJA	7	26	0	0	1	2	0
AWRAJA	8	17	0	0	0	0	0
AWRAJA	9	35	0	0	1	0	1
AWRAJA	10	58	0	0	1	0	0
AWRAJA	11	12	0	0	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	25.00	0.0	0.0	25.00	25.00	25.00
AWRAJA	3	5.26	89.47	0.0	5.26	0.0	0.0
AWRAJA	4	77.78	0.0	0.0	18.52	3.70	0.0
AWRAJA	5	80.00	0.0	0.0	10.00	10.00	0.0
AWRAJA	6	80.65	0.0	0.0	19.35	0.0	0.0
AWRAJA	7	89.66	0.0	0.0	3.45	6.90	0.0
AWRAJA	8	100.00	0.0	0.0	0.0	0.0	0.0
AWRAJA	9	94.59	0.0	0.0	2.70	0.0	2.70
AWRAJA	10	98.31	0.0	0.0	1.69	0.0	0.0
AWRAJA	11	100.00	0.0	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 24 Code

0 No Reply
1 Used
2 Not Used
3 System Not Known To The Farmer

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 24: USE OF MANURE

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	4	0	0	0
AWRAJA	3	1	7	10	1	0	0
AWRAJA	4	1	12	12	2	0	0
AWRAJA	5	1	1	18	0	0	0
AWRAJA	6	4	1	22	4	0	0
AWRAJA	7	1	3	23	2	0	0
AWRAJA	8	0	0	17	0	0	0
AWRAJA	9	6	0	31	0	0	0
AWRAJA	10	3	4	51	1	0	0
AWRAJA	11	2	0	10	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	3	5.26	36.84	52.63	5.26	0.0	0.0
AWRAJA	4	3.70	44.44	44.44	7.41	0.0	0.0
AWRAJA	5	5.00	5.00	90.00	0.0	0.0	0.0
AWRAJA	6	12.90	3.23	70.97	12.90	0.0	0.0
AWRAJA	7	3.45	10.34	79.31	6.90	0.0	0.0
AWRAJA	8	0.0	0.0	100.00	0.0	0.0	0.0
AWRAJA	9	16.22	0.0	83.78	0.0	0.0	0.0
AWRAJA	10	5.08	6.78	86.44	1.69	0.0	0.0
AWRAJA	11	16.67	0.0	83.33	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 25 Code

0 No Reply
1 Sufficient Water Available
2 Not Available
3 Farmer Does Not Know

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 25: SUFFICIENCY OF WATER

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	3	1	0	0	0
AWRAJA	3	1	13	5	0	0	0
AWRAJA	4	1	17	9	0	0	0
AWRAJA	5	0	18	2	0	0	0
AWRAJA	6	1	21	9	0	0	0
AWRAJA	7	0	19	8	2	0	0
AWRAJA	8	0	9	8	0	0	0
AWRAJA	9	3	25	9	0	0	0
AWRAJA	10	0	38	21	0	0	0
AWRAJA	11	0	12	0	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	75.00	25.00	0.0	0.0	0.0
AWRAJA	3	5.26	68.42	26.32	0.0	0.0	0.0
AWRAJA	4	3.70	62.96	33.33	0.0	0.0	0.0
AWRAJA	5	0.0	90.00	10.00	0.0	0.0	0.0
AWRAJA	6	3.23	67.74	29.03	0.0	0.0	0.0
AWRAJA	7	0.0	65.52	27.59	6.90	0.0	0.0
AWRAJA	8	0.0	52.94	47.06	0.0	0.0	0.0
AWRAJA	9	8.11	67.57	24.32	0.0	0.0	0.0
AWRAJA	10	0.0	64.41	35.59	0.0	0.0	0.0
AWRAJA	11	0.0	100.00	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 26 Code

0 No Reply
1 Sufficient Grass Available
2 Not Available
3 Farmer Does Not Know

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 26: SUFFICIENCY OF GRASS

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	2	1	1	0	0	0
AWRAJA	3	1	13	5	0	0	0
AWRAJA	4	3	9	15	0	0	0
AWRAJA	5	1	10	9	0	0	0
AWRAJA	6	1	20	10	0	0	0
AWRAJA	7	0	20	7	2	0	0
AWRAJA	8	0	13	4	0	0	0
AWRAJA	9	4	14	19	0	0	0
AWRAJA	10	1	35	23	0	0	0
AWRAJA	11	0	12	0	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	50.00	25.00	25.00	0.0	0.0	0.0
AWRAJA	3	5.26	68.42	26.32	0.0	0.0	0.0
AWRAJA	4	11.11	33.33	55.56	0.0	0.0	0.0
AWRAJA	5	5.00	50.00	45.00	0.0	0.0	0.0
AWRAJA	6	3.23	64.52	32.26	0.0	0.0	0.0
AWRAJA	7	0.0	68.97	24.14	6.90	0.0	0.0
AWRAJA	8	0.0	76.47	23.53	0.0	0.0	0.0
AWRAJA	9	10.81	37.84	51.35	0.0	0.0	0.0
AWRAJA	10	1.69	59.32	38.98	0.0	0.0	0.0
AWRAJA	11	0.0	100.00	0.0	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 27 Code

0 No Reply
1 Innoculated
2 Not Innoculated

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 27: INNOCULATION

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	2	2	0	0	0
AWRAJA	3	4	10	5	0	0	0
AWRAJA	4	4	20	3	0	0	0
AWRAJA	5	1	16	3	0	0	0
AWRAJA	6	4	26	1	0	0	0
AWRAJA	7	1	25	3	0	0	0
AWRAJA	8	0	16	1	0	0	0
AWRAJA	9	3	31	3	0	0	0
AWRAJA	10	5	52	2	0	0	0
AWRAJA	11	0	1	11	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	50.00	50.00	0.0	0.0	0.0
AWRAJA	3	21.05	52.63	26.32	0.0	0.0	0.0
AWRAJA	4	14.81	74.07	11.11	0.0	0.0	0.0
AWRAJA	5	5.00	80.00	15.00	0.0	0.0	0.0
AWRAJA	6	12.90	83.87	3.23	0.0	0.0	0.0
AWRAJA	7	3.45	86.21	10.34	0.0	0.0	0.0
AWRAJA	8	0.0	94.12	5.88	0.0	0.0	0.0
AWRAJA	9	8.11	83.78	8.11	0.0	0.0	0.0
AWRAJA	10	8.47	88.14	3.39	0.0	0.0	0.0
AWRAJA	11	0.0	8.33	91.67	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 28 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 28: CEREALS (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	4	0	0	0	0
AWRAJA	3	1	18	0	0	0	0
AWRAJA	4	0	27	0	0	0	0
AWRAJA	5	0	20	0	0	0	0
AWRAJA	6	0	29	1	0	1	0
AWRAJA	7	1	28	0	0	0	0
AWRAJA	8	0	17	0	0	0	0
AWRAJA	9	1	36	0	0	0	0
AWRAJA	10	1	25	12	4	5	12
AWRAJA	11	0	6	6	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	3	5.26	94.74	0.0	0.0	0.0	0.0
AWRAJA	4	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	5	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	6	0.0	93.55	3.23	0.0	3.23	0.0
AWRAJA	7	3.45	96.55	0.0	0.0	0.0	0.0
AWRAJA	8	0.0	100.00	0.0	0.0	0.0	0.0
AWRAJA	9	2.70	97.30	0.0	0.0	0.0	0.0
AWRAJA	10	1.69	42.37	20.34	6.78	8.47	20.34
AWRAJA	11	0.0	50.00	50.00	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 29 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 29: MEAT (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	3	1	0	0
AWRAJA	3	1	0	5	1	10	2
AWRAJA	4	0	0	10	3	14	0
AWRAJA	5	0	0	1	1	17	1
AWRAJA	6	1	0	10	8	12	0
AWRAJA	7	1	0	8	11	9	0
AWRAJA	8	0	1	3	4	9	0
AWRAJA	9	1	1	6	6	23	0
AWRAJA	10	1	2	13	16	22	5
AWRAJA	11	0	0	2	1	9	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	75.00	25.00	0.0	0.0
AWRAJA	3	5.26	0.0	26.32	5.26	52.63	10.53
AWRAJA	4	0.0	0.0	37.04	11.11	51.85	0.0
AWRAJA	5	0.0	0.0	5.00	5.00	85.00	5.00
AWRAJA	6	3.23	0.0	32.26	25.81	38.71	0.0
AWRAJA	7	3.45	0.0	27.59	37.93	31.03	0.0
AWRAJA	8	0.0	5.88	17.65	23.53	52.94	0.0
AWRAJA	9	2.70	2.70	16.22	16.22	62.16	0.0
AWRAJA	10	1.69	3.39	22.03	27.12	37.29	8.47
AWRAJA	11	0.0	0.0	16.67	8.33	75.00	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 30 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 30: VEGETABLES (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	1	0	1	2
AWRAJA	3	1	7	2	0	2	7
AWRAJA	4	4	6	3	0	2	12
AWRAJA	5	0	0	3	1	5	11
AWRAJA	6	4	5	12	5	3	2
AWRAJA	7	1	5	8	8	2	5
AWRAJA	8	0	0	4	2	2	9
AWRAJA	9	1	9	8	2	0	17
AWRAJA	10	1	18	10	7	8	15
AWRAJA	11	0	0	2	1	1	8

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	25.00	0.0	25.00	50.00
AWRAJA	3	5.26	36.84	10.53	0.0	10.53	36.84
AWRAJA	4	14.81	22.22	11.11	0.0	7.41	44.44
AWRAJA	5	0.0	0.0	15.00	5.00	25.00	55.00
AWRAJA	6	12.90	16.13	38.71	16.13	9.68	6.45
AWRAJA	7	3.45	17.24	27.59	27.59	6.90	17.24
AWRAJA	8	0.0	0.0	23.53	11.76	11.76	52.94
AWRAJA	9	2.70	24.32	21.62	5.41	0.0	45.95
AWRAJA	10	1.69	30.51	16.95	11.86	13.56	25.42
AWRAJA	11	0.0	0.0	16.67	8.33	8.33	66.67

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 31 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 31: FRUIT (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	1	1	1	1
AWRAJA	3	1	4	2	1	2	9
AWRAJA	4	9	0	1	1	3	13
AWRAJA	5	0	0	2	1	4	13
AWRAJA	6	8	1	6	3	4	9
AWRAJA	7	4	1	1	6	4	13
AWRAJA	8	0	0	0	3	1	13
AWRAJA	9	1	1	1	1	4	29
AWRAJA	10	1	6	4	8	6	34
AWRAJA	11	0	0	0	6	1	5

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	25.00	25.00	25.00	25.00
AWRAJA	3	5.26	21.05	10.53	5.26	10.53	47.37
AWRAJA	4	33.33	0.0	3.70	3.70	11.11	48.15
AWRAJA	5	0.0	0.0	10.00	5.00	20.00	65.00
AWRAJA	6	25.81	3.23	19.35	9.68	12.90	29.03
AWRAJA	7	13.79	3.45	3.45	20.69	13.79	44.83
AWRAJA	8	0.0	0.0	0.0	17.65	5.88	76.47
AWRAJA	9	2.70	2.70	2.70	2.70	10.81	78.38
AWRAJA	10	1.69	10.17	6.78	13.56	10.17	57.63
AWRAJA	11	0.0	0.0	0.0	50.00	8.33	41.67

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 32 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 32: MILK (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	2	1	1	0	0
AWRAJA	3	1	0	4	1	9	4
AWRAJA	4	1	5	10	1	9	1
AWRAJA	5	0	4	13	0	3	0
AWRAJA	6	0	18	9	1	3	0
AWRAJA	7	1	15	10	1	1	1
AWRAJA	8	0	11	3	1	2	0
AWRAJA	9	1	18	15	0	2	1
AWRAJA	10	1	20	24	4	7	3
AWRAJA	11	0	7	5	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	50.00	25.00	25.00	0.0	0.0
AWRAJA	3	5.26	0.0	21.05	5.26	47.37	21.05
AWRAJA	4	3.70	18.52	37.04	3.70	33.33	3.70
AWRAJA	5	0.0	20.00	65.00	0.0	15.00	0.0
AWRAJA	6	0.0	58.06	29.03	3.23	9.68	0.0
AWRAJA	7	3.45	51.72	34.48	3.45	3.45	3.45
AWRAJA	8	0.0	64.71	17.65	5.88	11.76	0.0
AWRAJA	9	2.70	48.65	40.54	0.0	5.41	2.70
AWRAJA	10	1.69	33.90	40.68	6.78	11.86	5.08
AWRAJA	11	0.0	58.33	41.67	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 33 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 33: MILK PRODUCTS (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0	1	2	1	0	0
AWRAJA 3	1	0	3	2	9	4
AWRAJA 4	1	1	11	1	11	2
AWRAJA 5	0	3	13	0	4	0
AWRAJA 6	2	13	11	1	3	1
AWRAJA 7	2	7	16	2	1	1
AWRAJA 8	0	5	9	0	3	0
AWRAJA 9	1	10	19	1	6	0
AWRAJA 10	1	14	23	11	7	3
AWRAJA 11	0	5	7	0	0	0

PERCENTAGE DISTRIBUTION

	0	1	2	3	4	5
AWRAJA 2	0.0	25.00	50.00	25.00	0.0	0.0
AWRAJA 3	5.26	0.0	15.79	10.53	47.37	21.05
AWRAJA 4	3.70	3.70	40.74	3.70	40.74	7.41
AWRAJA 5	0.0	15.00	65.00	0.0	20.00	0.0
AWRAJA 6	6.45	41.94	35.48	3.23	9.68	3.23
AWRAJA 7	6.90	24.14	55.17	6.90	3.45	3.45
AWRAJA 8	0.0	29.41	52.94	0.0	17.65	0.0
AWRAJA 9	2.70	27.03	51.35	2.70	16.22	0.0
AWRAJA 10	1.69	23.73	38.98	18.64	11.86	5.08
AWRAJA 11	0.0	41.67	58.33	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 34 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 34: ENSETE (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	0	0	0	4
AWRAJA	3	1	0	0	0	0	18
AWRAJA	4	1	0	0	0	0	26
AWRAJA	5	0	0	0	0	0	20
AWRAJA	6	6	5	1	1	5	13
AWRAJA	7	4	1	3	4	2	15
AWRAJA	8	0	0	1	0	0	16
AWRAJA	9	1	6	3	0	2	25
AWRAJA	10	1	47	3	0	1	7
AWRAJA	11	0	10	2	0	0	0

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	0.0	0.0	0.0	100.00
AWRAJA	3	5.26	0.0	0.0	0.0	0.0	94.74
AWRAJA	4	3.70	0.0	0.0	0.0	0.0	96.30
AWRAJA	5	0.0	0.0	0.0	0.0	0.0	100.00
AWRAJA	6	19.35	16.13	3.23	3.23	16.13	41.94
AWRAJA	7	13.79	3.45	10.34	13.79	6.90	51.72
AWRAJA	8	0.0	0.0	5.88	0.0	0.0	94.12
AWRAJA	9	2.70	16.22	8.11	0.0	5.41	67.57
AWRAJA	10	1.69	79.66	5.08	0.0	1.69	11.86
AWRAJA	11	0.0	83.33	16.67	0.0	0.0	0.0

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 35 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 35: FISH (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	0	0	4	0
AWRAJA	3	1	1	4	0	3	10
AWRAJA	4	3	0	0	1	8	15
AWRAJA	5	0	0	0	0	0	20
AWRAJA	6	6	0	2	1	4	18
AWRAJA	7	4	0	1	0	5	19
AWRAJA	8	0	0	2	0	0	15
AWRAJA	9	1	4	6	3	3	20
AWRAJA	10	1	0	0	2	4	52
AWRAJA	11	0	0	0	0	0	12

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	0.0	0.0	100.00	0.0
AWRAJA	3	5.26	5.26	21.05	0.0	15.79	52.63
AWRAJA	4	11.11	0.0	0.0	3.70	29.63	55.56
AWRAJA	5	0.0	0.0	0.0	0.0	0.0	100.00
AWRAJA	6	19.35	0.0	6.45	3.23	12.90	58.06
AWRAJA	7	13.79	0.0	3.45	0.0	17.24	65.52
AWRAJA	8	0.0	0.0	11.76	0.0	0.0	88.24
AWRAJA	9	2.70	10.81	16.22	8.11	8.11	54.05
AWRAJA	10	1.69	0.0	0.0	3.39	6.78	88.14
AWRAJA	11	0.0	0.0	0.0	0.0	0.0	100.00

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Appendix 19 Table 36 Code

0 No Reply
1 Everyday
2 Once or Twice a Week
3 Once a Month
4 On Rare Occasions
5 Never

Source: Questionnaire Survey, C.P.Singh, 1969

TABLE 36: EGGS (FOOD CONSUMPTION)

FREQUENCY DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0	0	2	1	1	0
AWRAJA	3	1	1	4	2	9	2
AWRAJA	4	3	0	2	8	12	2
AWRAJA	5	0	1	8	2	7	2
AWRAJA	6	3	7	12	6	2	1
AWRAJA	7	1	5	12	1	8	2
AWRAJA	8	0	0	11	3	2	1
AWRAJA	9	2	1	17	3	7	7
AWRAJA	10	6	8	15	5	11	14
AWRAJA	11	1	0	4	0	2	5

PERCENTAGE DISTRIBUTION

		0	1	2	3	4	5
AWRAJA	2	0.0	0.0	50.00	25.00	25.00	0.0
AWRAJA	3	5.26	5.26	21.05	10.53	47.37	10.53
AWRAJA	4	11.11	0.0	7.41	29.63	44.44	7.41
AWRAJA	5	0.0	5.00	40.00	10.00	35.00	10.00
AWRAJA	6	9.68	22.58	38.71	19.35	6.45	3.23
AWRAJA	7	3.45	17.24	41.38	3.45	27.59	6.90
AWRAJA	8	0.0	0.0	64.71	17.65	11.76	5.88
AWRAJA	9	5.41	2.70	45.95	8.11	18.92	18.92
AWRAJA	10	10.17	13.56	25.42	8.47	18.64	23.73
AWRAJA	11	8.33	0.0	33.33	0.0	16.67	41.67

N.B. AWRAJA 1 IS INCORPORATED INTO AWRAJA 2

Questionnaire Used For Field-Work

Village _____
Wareda _____
Awraja _____

1. Identification

1.1 Name _____ 1.2 Sex _____

1.3 Age _____ 1.4 Education (Highest grade completed) _____

2. Total no. of persons in the household and occupation of the household

2.1 Total no. of persons in the household _____ 2.2 Occupation _____

2.3 Total area of the holding _____

2.4 Total area cultivated _____ 2.5 Area Uncultivated _____

2.6 Total area under horticulture: a) Vegetables _____

b) Fruits _____

2.7 Area under grasslands _____ 2.8 Under Woodlands _____

3.

Crops sown	Approx. area under each crop	Time of sowing	Time of harvesting	App. yield
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

4. Crop rotation: Which crop is sown in:-

Year 1
Year 2
Year 3
Year 4
Year 5
Year 6

(If more than one crop is obtained from the same field in one year, mention it against the year)

5. Soil conservation: Do you practise:-

	Yes	No	Do not know
5.1 Terracing	_____	_____	_____

Questionnaire page 2

	Yes	No	Do not Know
5.2 Bunding			
5.3 Contour ploughing			
5.4 Afforestation			
5.5 Grassing			
5.6 Any other			

6. Soil enrichment:

6.1 Fertilisers			
6.2 Manures			
6.3 Grass burning			
6.4 Any other			

7. Land rotation: _____

_____

8. Type/s of tenancy: _____

9. Irrigation:

9.1 How much area do you irrigate _____

9.2 Which crops do you irrigate _____

9.3 What is the source of irrigation (lake, river, stream, well, any other) _____

10. 10.1 Drainage problems, if any _____

10.2 What have you done to solve these problems _____

_____

11. Grasslands: 11.1 Do you use any kind of manure for the better growth of grass- YES NO DO NOT KNOW (Tick whichever applicabl

11.2 Is a) water, and b) grass at your farm sufficient for the cattle:

a) YES NO DO NOT KNOW (Tick whichever applicable)

b) YES NO DO NOT KNOW

11.3 If not, what is done to make these available _____

_____

11.4 What is the approximate number of your cattle _____

Livestock/poultry	Number owned
1. sheep	
2. goats	
3. cows	
4. chicken	
5. oxen	
6. horses	

7. donkeys _____
8. mules _____
9. others (specify) _____

11.5 What are the main diseases among your cattle: (Tick those of the following which are applicable. The names given in bracket are Amharic names for the diseases most prevalent in Ethiopia.) a) anthrax (aba senga) b) rinderpest (desta or wotete) c) blackleg (aba gurba) d) mastites (yetur beshita) e) foot and mouth (afta) f) liverfluke (dedaho) g) ringworm (yekoda bashita) h) any other (specify)

11.6 Were any of your animals innoculated in the past two year

Yes No (Tick which is applicable)

11.7 What other things than the grass do you give to your cattle ___

_____

12. Woodlands:

12.1 How do you mainly use the woodlands _____

_____

13. Food consumption pattern:

13.1 What does your family eat:-

	Everyday	Once or twice a week	Once a month	On rare occasions	Never
a. cereals					
b. meat					
c. vegetables					
d. fruits					
e. milk					
f. milk products					
g. ensete					
h. fish					
i. eggs					
j. any other (specify)					

14. Any other information